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# **Simi Valley System Water Master Plan**

**Golden State Water Company**

December 2019

# Executive Summary

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## Purpose

The purpose of this Master Plan is to assess Golden State Water Company's (GSWC) Simi Valley System's ability to meet current and future water needs, and to identify upgrades needed if deficiencies exist. This assessment is developed by using hydraulic analysis criteria, future demands and available supply, water quality standards, and condition of facilities.

These updates provide GSWC with a basis to determine the impacts of new development on the existing system and to identify system deficiencies and improvements needed to correct them. These system improvement needs are used as the basis for developing the Capital Improvement Program (CIP) for the system. TABLE 9-1 summarizes the CIP projects identified in this master plan.

GSWC's goal is to meet the minimum requirements identified in the technical memorandum titled *Golden State Water Company Master Planning Criteria and Standards* (see Appendices).

## Master Plan Process

This master plan document is organized as follows:

- Update existing system information
- Establish existing demands and forecast future demands
- Update system's hydraulic model
- Evaluate supply and storage capacities
- Perform hydraulic analyses and evaluation
- Identify water quality issues
- Assess condition of facilities in the system
- Develop CIP

# Contents

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<b>Executive Summary.....</b>	<b>iii</b>
<b>Contents.....</b>	<b>v</b>
Appendices (provided on CD).....	vii
<b>Tables.....</b>	<b>vii</b>
<b>Figures .....</b>	<b>viii</b>
<b>Acronyms and Abbreviations .....</b>	<b>ix</b>
<b>Introduction.....</b>	<b>1-1</b>
1.1 Overview of Golden State Water Company .....	1-1
1.2 Master Plan Update.....	1-1
1.3 Document Organization .....	1-2
<b>Existing Water System Facilities.....</b>	<b>2-1</b>
2.1 Overview .....	2-1
2.2 Facility Descriptions.....	2-1
2.2.1 Pressure and Distribution Zones.....	2-1
2.2.2 Supply Sources.....	2-2
2.2.3 Storage Facilities .....	2-4
2.2.4 Pumping Stations.....	2-5
2.2.5 Pressure Regulating and Flow Control Stations .....	2-7
2.2.6 Transmission and Distribution Pipelines.....	2-8
<b>Existing and Future Water Demands.....</b>	<b>3-1</b>
3.1 Demand Definitions and Periods .....	3-1
3.2 Existing Demands.....	3-1
3.2.1 Historical Water Use .....	3-2
3.2.2 Establishing Demands .....	3-3
3.3 Future Demand Projections.....	3-5
3.3.1 Growth Rate Projections.....	3-5
3.3.2 Water Demand Projections.....	3-5
<b>Hydraulic Model Development and Calibration .....</b>	<b>4-1</b>
4.1 Overview .....	4-1
4.2 Construction and Calibration of the Hydraulic Computer Model.....	4-1
4.3 Summary.....	4-1
<b>Supply and Storage Capacity Evaluation .....</b>	<b>5-1</b>
5.1 Overview .....	5-1
5.2 Evaluation Approach.....	5-1
5.2.1 Analysis Criteria .....	5-1
5.2.2 Storage.....	5-3
5.3 Existing System Evaluation.....	5-4
5.3.1 Existing System Water Demands for Each Demand Period.....	5-5
5.3.2 Existing System Supply Facilities.....	5-5
5.3.3 Existing System Storage Facilities .....	5-6
5.3.4 Existing System Supply and Capacity Analysis.....	5-6
5.3.5 Existing System Storage Analysis .....	5-12

5.3.6	Proposed Improvements to Address Deficiencies in the Existing System .....	5-14
5.3.7	Recommended Improvements to Address Deficiencies in the Existing System.....	5-15
5.4	2040 System Evaluation.....	5-15
5.4.1	2040 System Water Demands for Each Demand Period.....	5-15
5.4.2	2040 System Supply Facilities.....	5-15
5.4.3	2040 System Storage Facilities .....	5-16
5.4.4	2040 System Capacity Analysis.....	5-16
5.4.5	2040 System Storage Analysis .....	5-17
5.4.6	Proposed Improvements to Address Deficiencies in the 2040 System....	5-17
5.4.7	Recommended Improvements to Address Deficiencies in the 2040 System .....	5-18
5.5	Summary of Proposed Supply and Storage Improvements through 2040 ..	5-18
	<b>Hydraulic Analysis and Evaluation.....</b>	<b>6-1</b>
6.1	Overview .....	6-1
6.2	Analysis Approach .....	6-1
6.2.1	System Performance Criteria.....	6-2
6.2.2	Fire-flow Requirements.....	6-2
6.3	Existing System Hydraulic Analysis .....	6-2
6.3.1	Operational Assumptions .....	6-3
6.3.2	Average Day Scenario Analysis.....	6-5
6.3.3	Maximum Day Scenario Analysis.....	6-5
6.3.4	Peak Hour Scenario Analysis .....	6-5
6.3.5	Fire-flow Scenario Analysis .....	6-5
6.3.6	Analysis Results and Recommended Improvements for the Existing System .....	6-5
	<b>Water Quality Evaluation .....</b>	<b>7-1</b>
7.1	Current Status of Drinking Water Quality .....	7-1
7.2	Imported Water Quality .....	7-1
7.3	Groundwater Quality .....	7-2
7.4	Water Quality Evaluation .....	7-2
7.4.1	Total Dissolved Solids (TDS) .....	7-2
7.4.2	Nitrate.....	7-2
7.4.3	Nitrification.....	7-2
7.4.4	Selenium.....	7-3
7.4.5	Perchlorate .....	7-3
7.4.6	Per- and Polyfluoroalkyl Substances.....	7-3
7.5	Recommended Improvements .....	7-4
	<b>System Condition Assessment .....</b>	<b>8-1</b>
8.1	Previous System Condition Assessment Efforts.....	8-1
8.2	Updated Condition Assessments.....	8-1
8.2.1	Facility Condition Review.....	8-1
8.2.2	Pipeline Condition Review .....	8-3
	<b>Capital Improvement Program.....</b>	<b>9-1</b>
9.1	Cost Estimation .....	9-1

9.2	Project Prioritization .....	9-1
9.3	CIP Projects.....	9-1
9.4	Additional Considerations .....	9-2
	<b>References .....</b>	<b>10-1</b>

## Appendices (provided on CD)

- A Master Planning Criteria and Standards Technical Memorandum
- B Detailed Supply and Storage Evaluation

## Tables

TABLE 2-1	Pressure Zone Details .....	2-2
TABLE 2-2	Active Wells .....	2-3
TABLE 2-3	Non-Operational Wells.....	2-3
TABLE 2-4	Imported Water Supply Connections.....	2-4
TABLE 2-5	Emergency Interconnections.....	2-4
TABLE 2-6	Storage Tanks .....	2-5
TABLE 2-7	Booster Pumps.....	2-5
TABLE 2-8	Pressure Regulating and Flow Control Valves .....	2-8
TABLE 2-9	Pipes by Size and Material .....	2-9
TABLE 2-10	Pipes by Size and Year Built .....	2-9
TABLE 3-1	Historical Annual Water Production.....	3-2
TABLE 3-2	Historical Average and Maximum Day Demand.....	3-4
TABLE 3-3	Projected System Demands by Demand Period .....	3-5
TABLE 3-4	Water System Demands by Demand Period .....	3-6
TABLE 5-1	Supply and Storage Capacity Analysis Criteria.....	5-2
TABLE 5-2	Criteria for Calculating Storage.....	5-3
TABLE 5-3	Fire Storage Volumes .....	5-4
TABLE 5-4	Existing System Water Demands .....	5-5
TABLE 5-5	Existing System Supply Facilities.....	5-5
TABLE 5-6	Existing System Storage Facilities .....	5-6
TABLE 5-7	Existing System Supply and Capacity Analysis – White Bark Zone .....	5-7
TABLE 5-8	Existing System Supply and Capacity Analysis – Pineview Booster Zone.....	5-8
TABLE 5-9	Existing System Supply and Capacity Analysis – Alamo Zone .....	5-9
TABLE 5-10	Existing System Supply and Capacity Analysis – Calleguas Zone.....	5-10
TABLE 5-11	Existing System Supply and Capacity Analysis – Katherine Zone.....	5-11
TABLE 5-12	Existing System Supply and Capacity Analysis – Systemwide.....	5-12
TABLE 5-13	Existing System Storage Analysis - Calculated Storage.....	5-13
TABLE 5-14	Existing System Storage Analysis - Adequacy Evaluation.....	5-14

TABLE 5-15 Existing System Proposed Supply and Storage Improvements .....	5-14
TABLE 5-16 Existing System Recommended Supply and Storage Improvements .....	5-15
TABLE 5-17 2040 System Water Demands .....	5-15
TABLE 5-18 2040 System Assumed Supply Facilities .....	5-16
TABLE 5-19 2040 System Assumed Storage Facilities .....	5-16
TABLE 5-20 2040 System Supply and Capacity Analysis – Systemwide .....	5-16
TABLE 5-21 2040 System Storage Analysis .....	5-17
TABLE 5-22 2040 System Proposed Supply and Storage Improvements .....	5-18
TABLE 5-23 2040 System Recommended Supply and Storage Improvements .....	5-18
TABLE 6-1 Hydraulic Analysis Criteria .....	6-2
TABLE 6-2 Existing System Operating Facility Status .....	6-4
TABLE 6-3 Existing System Deficiencies and Recommend Improvements for ADD, MDD, and PHD .....	6-7
TABLE 7-1 Recommended Improvements to Address Water Quality Concerns .....	7-4
TABLE 8-1 2011 Condition Assessment Plant Projects .....	8-2
TABLE 8-2 2011 Condition Assessment Pipeline Projects .....	8-3
TABLE 9-1 Summary of Recommend CIP Projects .....	9-2

## Figures

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FIGURE 1-1 GSWC Systems Overview Map .....	1-7
FIGURE 2-1 Simi Valley System Overview Map .....	2-13
FIGURE 2-2 Hydraulic Profile .....	2-14
FIGURE 3-1 Historical Annual Production Totals and Active Service Connections for the Last 10 Years .....	3-3
FIGURE 3-2 Historical Water Demand and Future Water Demand Projections .....	3-6
FIGURE 8-1 Leak Map .....	8-7
FIGURE 9-1 Pipeline Projects .....	9-5
FIGURE 9-2 Plant Projects .....	9-6

# Acronyms and Abbreviations

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1,1-DCE	1,1-dichloroethylene
2015 UWMP	2015 Urban Water Management Plan
2016 WMP	Simi Valley 2016 Water Master Plan
AACE International	Association for the Advancement of Cost Engineering International
ADD	average day demand
AFY	acre-feet per year
amsl	above mean sea level
AOB	ammonia-oxidizing bacteria
CIP	capital improvement program
CPUC	California Public Utilities Commission
DDW	State Water Resources Control Board, Division of Drinking Water
DPB Rule	Disinfectants and Disinfection Byproducts Rule
DWR	California Department of Water Resources
EPA	U.S. Environmental Protection Agency
FCV	flow-control valve
fps	foot or feet per second
GAC	granular activated carbon
gpm	gallons per minute
GSWC	Golden State Water Company
GWO	General Work Order
HPC	heterotrophic plate count
IDSE	Initial Distribution System Evaluation
MCL	maximum contaminant level
MDD	maximum day demand
Metropolitan	Metropolitan Water District of Southern California
Metropolitan Administrative Code	Metropolitan Water District Administrative Code, April 12, 2011 revision

MG	million gallons
MHD	minimum hour demand
NAICS	North American Industry Classification System
NOB	nitrite-oxidizing bacteria
O&M	operations and maintenance
PCE	tetrachloroethylene
PHD	peak hour demand
PRV	pressure-regulating valve
psi	pounds per square inch
PSV	pressure-sustaining valve
SCADA	supervisory control and data acquisition
SCAG	Southern California Association of Governments
SDWA	Safe Drinking Water Act
TDS	total dissolved solids
TTHM	total trihalomethanes
UWMP	Urban Water Management Plan
VOC	volatile organic compound
WMP	Water Master Plan

# Introduction

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## 1.1 Overview of Golden State Water Company

GSWC is a subsidiary of American States Water Company, an investor-owned utility dedicated to increasing value through the expert management of utility assets and services. As a public utility, GSWC is committed to the purchase, production, distribution, and sale of water to over 260,000 customer connections.

GSWC is organized into three regions throughout the state of California. Region I is located in northern and central coast of California. Region II serves communities in Los Angeles County. Region III serves communities in Los Angeles, San Bernardino, Imperial, and Orange counties.

FIGURE 1-1, provided at the end of this section, shows the locations of all GSWC water systems.

## 1.2 Master Plan Update

The purpose of this master plan is to assess the Simi Valley System's ability to meet current and future water needs and recommend system upgrades needed to meet current customer needs. This assessment is developed by using hydraulic design criteria, water quality standards, system demands and available supply, and facility condition assessments.

Specifically, this master plan supports GSWC's effort to update existing master plans and hydraulic models for water systems throughout the company. These updates provide GSWC with a baseline for determining the impacts of new development on existing systems as well as identifying short, mid, and long term system needs. These system needs are used as the basis for developing the capital improvement program (CIP) for the system. The primary drivers of this master plan update are the following:

- Assess the distribution system's hydraulic performance
- Identify infrastructure that is in poor condition and needs to be replaced
- Identify supply and storage needs
- Identify water quality and treatment needs
- Provide documentation for the proposed CIP projects in support of the General Rate Case for the California Public Utilities Commission (CPUC)
- Reduce operations and maintenance (O&M) efforts and costs required to maintain service under current conditions
- Minimize service failures

## 1.3 Document Organization

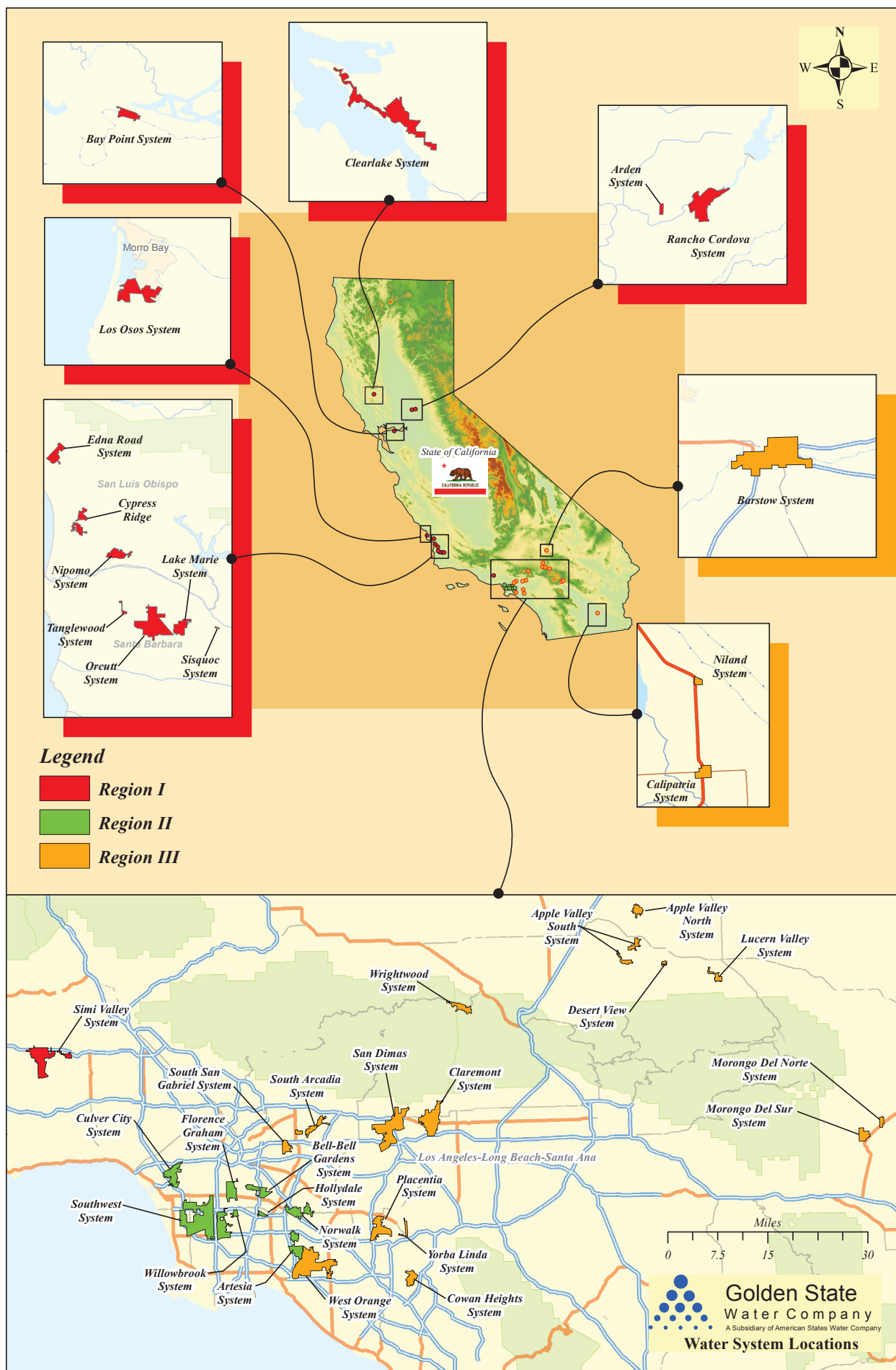
This master plan document is organized to provide information in a sequential manner that considers historical progression (past to present to future) and logical evaluation of the system from existing facilities and requirements through future needs. Each section's title and a brief summary are as follows:

1. **Introduction:** Provides background information on the company and its systems.
2. **Existing Water System Facilities:** Provides an overview of the system and its facilities. System facilities identified include the system service area boundary, pressure zones, distribution areas, supply sources, storage facilities, pump stations, pressure regulating and water control stations, and transmission and distribution pipelines.
3. **Existing and Future Demands:** Provides definition of demand types and periods, as well as existing and future demands. Explains the demand development approach and determination of peaking factors. Provides the current demands and projected demands developed for a future 2040 condition. Future demands are based on population growth rate and water use projections.
4. **Hydraulic Model Development and Calibration:** Provides an overview of the modeling process, including hydraulic model construction and calibration.
5. **Supply and Storage Capacity Evaluation:** Documents the evaluation of the system's water supply and storage capacity using the objectives identified in GSWC's *Master Planning Criteria and Standards*. The evaluation results establish supply and storage needs for each distribution area and the entire distribution system. Existing and future supply and storage deficiencies are also identified. Recommended improvements to mitigate deficiencies are also provided.
6. **Hydraulic Analysis and Evaluation:** Outlines the approach for the hydraulic analysis. Details how the updated hydraulic model was used to determine hydraulic deficiencies under simulated demand scenarios and was compared with the analysis and planning criteria for short, mid, and long term planning periods. Provides recommendations to address deficiencies that were identified. Scenarios simulated by the hydraulic model include average day, maximum day, and peak hour conditions.
7. **Water Quality Analysis:** Provides GSWC's evaluation of water quality based on current and pending federal and state standards and rules.
8. **System Condition Assessment:** Provides GSWC's documentation of system condition assessment efforts including past efforts, recent field inspections, and recommendations for future improvements.
9. **Capital Improvement Program:** Describes the CIP plan resulting from all preceding tasks broken down into short, mid, and long term planning periods. This includes prioritization and justification for the projects included in the CIP.
10. **References:** Lists the primary sources of information referred to throughout the master plan.

Appendices provide supporting information on various specifications and details referred to throughout the master plan.

**Figures**

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## SECTION 2

# Existing Water System Facilities

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This section documents existing water system facilities for the Simi Valley System. Detailed information about the major facilities, such as water supply facilities, storage facilities, pipelines, pumping facilities, and regulating valves serves as the basis for subsequent system analysis throughout the master plan. This section begins with an overview of the system, and then presents detailed information about these facilities.

## 2.1 Overview

The Simi Valley System is located in Ventura County, covers approximately 9.5 square miles, and serves a portion of the City of Simi Valley.

The Simi Valley System obtains its water supply from local wells and purchased water from the Calleguas Municipal Water District (CMWD) at five locations. CMWD obtains treated water from the Metropolitan Water District of Southern California (Metropolitan).

The Simi Valley System has approximately 139 miles of pipelines that range in diameter from 2 to 24 inches.

## 2.2 Facility Descriptions

The major system facilities are shown in FIGURE 2-1 at the end of this Section. These facilities are discussed in detail in the following subsections:

- Pressure zones
- Supply sources
- Storage facilities
- Pumping stations
- Pressure regulating stations and flow control stations
- Transmission and distribution pipelines

### 2.2.1 Pressure and Distribution Zones

The Simi Valley System is comprised of five pressure zones. TABLE 2-1 provides details of these pressure zones and lists the PRVs and/or booster stations that connect the zones. FIGURE 2-2 presents the system's hydraulic profile (schematic of the water system).

TABLE 2-1 Pressure Zone Details

Pressure Zone	HGL (ft msl)	Elevations Served (ft msl)	Supply and Storage Facilities*		
			Storage Tanks	Wells and Purchased Water	PRV/Booster Stations
Alamo	1,120	850-1,035	Alamo Reservoir, Pineview Reservoir, Tapo Reservoir, Niles Forebay	Niles Well #1, Sycamore Well #3, and four CMWD connections (Sycamore, Tapo, Fitzgerald, and Rebecca)	PRV from Katherine Zone Niles Booster Station, Rebecca Booster Station, Fitzgerald Booster Station and Tapo Booster Station
Calleguas	1,055	832-902	-	-	3 PRVs from Alamo, PRV from Niles Plant, PRV from Fitzgerald Plant
Katherine	1,230	1,012-1,125	Lautenschlager Reservoirs #1 (North) & #2 (South)	Katherine CMWD Connection	Katherine Booster Station
Pineview Booster	1,260	940-1,115	-	-	2 PRVs from White Bark Zone Pineview Booster Station
White Bark <sup>a</sup>	1,392	1,120-1,250	White Bark Reservoir	-	Aspen Booster Station

\* Does not include hydropneumatic tanks or emergency interconnections.

<sup>a</sup> Facilities and customer service connections within pressure zone are under construction.

## 2.2.2 Supply Sources

GSWC currently obtains its water supply for the Simi Valley System from two primary sources: local groundwater from wells owned and operated by GSWC, and purchased water from CMWD.

### Groundwater

The system has two active wells; their locations are identified in FIGURE 2-1. The water produced from the wells is characterized by high nitrates and high total dissolved solids (TDS) content, and needs to be blended with treated purchased water in order to meet the recommended maximum contaminant level (MCL) for nitrates and secondary maximum contaminant level (SMCL) for TDS. The finished water meets all applicable state and federal water quality standards for potable water.

### Active Wells

Two groundwater wells were identified as active for this master plan. TABLE 2-2 presents the relevant data for these wells. The elevation shown for each well is the elevation of the wellhead facilities. The pumping water level is the depth measured from the wellhead to the surface of the groundwater while the well pump is operating. Pumping water levels were based on recent levels monitored and recorded by GSWC. The groundwater elevation was calculated by subtracting the pumping water level from the wellhead elevation. Total dynamic head (TDH) represents the amount of energy required by the pump to produce water at the given flow rate. - of the wells in the Simi Valley System have backup power.

TABLE 2-2 Active Wells

Well	Discharge Location	Wellhead Elevation (ft msl)	Pumping Water Level (ft)	Pumping Groundwater Elevation (ft msl)	TDH <sup>a</sup> (ft)	Capacity <sup>b</sup> (gpm)
Niles #1	Niles Forebay	915	194	721	220	850
Sycamore #3	Niles Forebay	920	138	782	202	700
<b>Total groundwater production capacity</b>						<b>1,550</b>

msl: above mean sea level

<sup>a</sup> TDH is based on pump design point data.

<sup>b</sup> Capacity is based on facility design capacity, under normal operating conditions, and may not reflect actual capacity at a given point in time.

### Non-operational Wells

The system has one non-operational well. A summary is provided in TABLE 2-3.

TABLE 2-3 Non-Operational Wells

Well	Discharge Location	Elevation (ft msl)	Previous Capacity (gpm)	Reason
Sycamore #2	N/A	920	N/A	Abandoned

### Purchased Water

Many water systems in Southern California have the ability to supplement local water supplies with purchased water from another water agency. Purchased water is typically used when the production capacity of the local supplies is insufficient to meet demands. The Simi Valley System's purchased water is provided by CMWD, which obtains its supply from Metropolitan's Jensen Water Treatment Plant, via the Santa Susana tunnel. If the tunnel is shut down, CMWD also has the capability to pump water from Lake Bard (at the west end of the valley) through two transmission mains to GSWC's CMWD connections. During the summer months, water from Lake Bard supplements imported Metropolitan deliveries.

Treated purchased water is delivered to the Simi Valley System through five CMWD connections: Tapo, Sycamore, Rebecca, Fitzgerald, and Katherine. The Niles Plant (via the Sycamore CMWD Connection) and the Rebecca Plant are supplied from the CMWD North Feeder Line, and the Tapo and Fitzgerald Plants are supplied from the CMWD South Feeder Line. The Katherine Plant is typically supplied from the CMWD South Feeder Line, but can also be supplied from the CMWD North Feeder Line. As shown in TABLE 2-4, these connections can provide a maximum flow rate of 25,000 gpm to the system. Regulating valves are used to control flow into GSWC facilities (such as tanks or booster pumps), which convey water into the distribution system.

TABLE 2-4 Imported Water Supply Connections

Imported Water Supply Connection	Hydraulic Grade Line (ft msl)	Capacity <sup>a</sup> (gpm)	Pressure Setting at Connection (psi)	Ground Surface Elevation (ft msl)	Imported Water Supply Pipeline
Tapo	1,112-1,131	3,500	73-81	965	CMWD South Feeder
Sycamore	1,112-1,130	8,000	74-82	930	CMWD North Feeder
Rebecca	1,112-1,128	3,500	40-68	980	CMWD North Feeder
Fitzgerald	1,111-1,130	7,000	95-103	895	CMWD South Feeder
Katherine	1,113-1,131	3,000	28-36	1,061	CMWD South or North Feeder
<b>Total purchased water supply capacity</b>					<b>25,000*</b>

\*The maximum total capacity of these connections is greater than peak historical water usage.

<sup>a</sup> Capacity is based on flow control setting, under normal operating conditions, and may not reflect actual capacity at a given point in time.

### Emergency Interconnections

Water distribution systems are often connected to neighboring water systems to allow the sharing of supplies during short-term emergencies or during planned shutdowns of a primary supply source. The Simi Valley System has one emergency interconnection; this interconnection is “normally closed” and must be manually opened to provide flow. The emergency interconnection is presented in TABLE 2-5.

TABLE 2-5 Emergency Interconnections

Interconnection Name/Location	Capacity* (gpm)	Notes
Stearns St., north of Cochran St.	2,450	10-in interconnection with City of Simi Valley/Water Works District #8

\* Capacity of an emergency interconnection is not considered a reliable supply; rather, it is considered an “interruptible” supply, as it is based on whether or not the neighboring water agency has available water.

## 2.2.3 Storage Facilities

Water distribution systems rely on stored water to help equalize fluctuations between supply and demand, to supply sufficient water for firefighting, and to meet demands during an emergency or an unplanned outage of a major supply source. This section describes the existing storage facilities in the system.

### Storage Tanks

The Simi Valley System has six reservoirs and one forebay tank. A summary of the Simi Valley System reservoirs is provided in TABLE 2-6.

TABLE 2-6 Storage Tanks

Tank	Type and Zone	Bottom of Tank (ft msl)	High Water Elevation (ft msl)	Tank Height (ft)	Diameter (ft)	Volume (MG)
Alamo	Ground level, gravity to Alamo Zone	1,100	1,126	26.0	100	1.50
Lautenschlager 1 (North)	Ground level, gravity to Katherine Zone	1,248	1,269	21.0	64	0.50
Lautenschlager 2 (South)	Ground level, gravity to Katherine Zone	1,248	1,267.5	19.5	64	0.50
Tapo	Ground level pumped to Alamo Zone (or by gravity to Alamo Zone in a fire flow event that would cause the check valve to open)	1,071	1,103	32.0	130	3.00
Niles Forebay	Ground level pumped to Alamo Zone	917	923	5.3	35	0.04
Pineview	Ground level pumped to Pineview Booster Zone, gravity to Alamo Zone	1,099	1,131	32.0	106	2.00
White Bark	Ground level, gravity to White Bark Zone	1,360	1,392	33.0	106	2.00
<b>Total systemwide storage capacity</b>						<b>9.54</b>

## 2.2.4 Pumping Stations

Pumping stations are required to convey water from ground-level tanks into the distribution system or from lower-pressure zones into higher-pressure zones (usually called booster pumping stations). Pumping stations may consist of one or more individual pumps. Multiple pumps at each station, or multiple pumping stations that serve the same pressure zone, help to increase water system reliability by ensuring that water can still be delivered into that zone if one pump is out of service. Critical pumping stations may be equipped with emergency power supplies in case of failure of the primary power source.

The Simi Valley System includes seven booster pumping stations. TABLE 2-7 presents booster pump data relevant to the water system analysis

TABLE 2-7 Booster Pumps

Facility	Pressure Zone		Backup Power Available	Elevation (ft msl)	TDH <sup>a</sup> (ft)	Capacity <sup>b</sup> (gpm)
	Suction	Discharge				
Fitzgerald Booster A	Fitzgerald CMWD Connection	Alamo Zone	-	894	95	600
Fitzgerald Booster B	Fitzgerald CMWD Connection	Alamo Zone	-	894	95	600
Katherine Booster A	Katherine CMWD Connection	Katherine Zone	Diesel Generator	1,040	172	400
Katherine Booster B	Katherine CMWD	Katherine	Diesel	1,040	172	400

	Connection	Zone	Generator			
Katherine Booster C	Katherine CMWD Connection	Katherine Zone	Diesel Generator	1,040	240	500
Katherine Booster D	Katherine CMWD Connection	Katherine Zone	Diesel Generator	1,040	172	400
Niles Booster A	Forebay Tank	Alamo Zone	-	915	224	700
Niles Booster B	Forebay Tank	Alamo Zone	-	915	224	850
Niles Booster D <sup>c</sup>	Sycamore CMWD Connection <sup>d</sup>	Alamo Zone	-	915	67	2,200
Niles Booster E	Sycamore CMWD Connection <sup>d</sup>	Alamo Zone	-	915	67	2,200
Niles Booster F	Sycamore CMWD Connection <sup>d</sup>	Alamo Zone	-	915	67	2,200
Pineview Booster A	Pineview Reservoir	Pineview Booster Zone	Diesel Generator	1,099	157	1,000
Pineview Booster B	Pineview Reservoir	Pineview Booster Zone	Diesel Generator	1,099	157	500
Pineview Booster C	Pineview Reservoir	Pineview Booster Zone	Diesel Generator	1,099	157	500
Pineview Booster D	Pineview Reservoir	Pineview Booster Zone	Diesel Generator	1,099	157	500
Rebecca Booster A	Rebecca CMWD Connection	Alamo Zone	-	978	86	1,000
Rebecca Booster B	Rebecca CMWD Connection	Alamo Zone	-	978	86	1,000
Rebecca Booster C	Rebecca CMWD Connection	Alamo Zone	-	978	86	1,000
Tapo Booster C	Tapo Reservoir	Alamo Zone	-	1,071	74	1,200
Tapo Booster D	Tapo Reservoir	Alamo Zone	-	1,071	74	1,200
Tapo Booster E	Tapo Reservoir	Alamo Zone	-	1,071	74	1,200
Aspen Booster A	Pineview Booster Zone	White Bark Zone	Diesel Generator	1,121	162	500
Aspen Booster B	Pineview Booster Zone	White Bark Zone	Diesel Generator	1,121	162	500

msl: above mean sea level

<sup>a</sup> TDH is based on pump design point data.

<sup>b</sup> Capacity is based on facility design capacity, under normal operating conditions, and may not reflect actual capacity at a given point in time..

<sup>c</sup> Niles Booster C can be empty, with space for a future pump.

<sup>d</sup> If the Sycamore CMWD Connection is not in service, valves can be manipulated so that the Fitzgerald connection provides suction water to Niles D, E and F instead of the Sycamore connection.

### 2.2.5 Pressure Regulating and Flow Control Stations

Pressure regulating and flow control stations allow distribution systems to transfer water from higher pressure zones to lower pressure zones without exceeding the allowable pressures in the lower zones or completely depressurizing the higher zone. The water is transferred through a valve that reduces the pressure or controls the flow rate to a specified setting. Regulating valves can operate based on one or more controlling parameters. The operational controls important to this analysis include pressure reducing, pressure sustaining, pressure relief, and flow rate:

- **Pressure reducing valve:** modulates to maintain a preset minimum downstream pressure setting; if the downstream pressure drops, then the valve will open until the downstream pressure matches the pressure setting.
- **Pressure sustaining valve:** modulates to maintain a preset minimum upstream pressure setting; if the upstream pressure drops, then the valve will close until the upstream pressure matches the pressure setting.
- **Pressure relief valve:** opens when the upstream pressure exceeds a preset maximum pressure setting.
- **Flow control valve:** modulates to maintain a preset flow rate through the valve regardless of pressure.

In addition to the regulating valves associated with CMWD connections listed in TABLE 2-4, above, the Simi Valley System contains nine functioning pressure regulating valves and one bypassed pressure reducing valve. TABLE 2-8 lists the relevant data for these valves.

TABLE 2-8 Pressure Regulating and Flow Control Valves

Name/Location	Pressure Zone		Type	Dia. (in)	Setting (psi)	Maximum Capacity (gpm)
	Upstream	Downstream				
Cochran St., w/o Stowe Ave.	Katherine	Alamo	PRV <sup>a</sup>	6	35	1,565
Bigelow Ave., s/o Larch St.	Alamo	Calleguas	PRV	4	63	800
Marvel Ave., s/o Cochran St.	Alamo	Calleguas	PRV	6	60	1,565
Larch St., w/o McDonald St.	Alamo	Calleguas	PRV	6	60	1,565
Loveday Ave. & Briar Patch Dr.	Alamo	Alamo	PRV	6	Bypassed <sup>b</sup>	1,800
Niles Plant	Niles boosters D, E & F	Calleguas	PRV	10	55	3,550
Fitzgerald Plant	CMWD	Calleguas	PRV	12	65	7,000
Alamo Plant	Alamo	Alamo Tank	Altitude	12	Tank level	7,000
Tapo Plant	Alamo	Tapo Tank	Altitude	10	Tank level	4,900
Pineview Plant	Pineview Booster	Pineview Tank	Relief Valve	4	61	800
Aspen Booster Station	White Bark	Pineview Booster	PRV	6	60	880
Aspen Booster Station	White Bark	Pineview Booster	PRV	4	60	390
Aspen Booster Station	White Bark	Pineview Booster	Relief Valve	6	TBD	1,800
Aspen Booster Station	White Bark	White Bark	Relief Valve	4	TBD	800
Sequoia Ave., n/o Palm St.	White Bark	Pineview Booster	PRV	6	67	1,800

<sup>a</sup> This valve is also equipped with a check valve feature to provide flow from the Alamo Zone in case of a pressure drop in the Katherine Zone.

<sup>b</sup> This pressure reducing valve was bypassed when the boundary between the Alamo Zone and Pineview Booster Zone was relocated; areas upstream and downstream of this PRV are in the Alamo Zone.

<sup>c</sup> Maximum capacity determined by lesser of 1) PRV capacity or 2) upstream/downstream pipeline size (flow at 10 ft/s), when diameter known.

## 2.2.6 Transmission and Distribution Pipelines

The Simi Valley System includes approximately 139 miles of pipelines ranging from 2 to 24 inches in diameter. TABLE 2-9 lists the estimated footage of pipelines by diameter and material.

TABLE 2-9 Pipes by Size and Material

Diameter (in)	Length of Pipe by Material (ft)					Total Length (ft)
	AC	CI	DI	PVC	STL	
2	-	-	-	40	-	<b>40</b>
4	30,013	10	104	1,050	-	<b>31,477</b>
6	280,547	94	9,786	3,333	46	<b>293,806</b>
8	180,078	1,341	64,620	6,105	482	<b>252,625</b>
10	61,369	54	608	678	150	<b>62,858</b>
12	26,011	422	40,893	6,952	1,112	<b>75,391</b>
14	2,650	-	-	-	-	<b>2,650</b>
16	11,238	386	1,116	-	165	<b>12,905</b>
24	-	-	28	-	792	<b>819</b>
<b>Totals (ft)</b>	592,206	2,308	117,155	18,158	2,747	<b>732,573</b>
<b>Totals (mi)</b>	112.2	0.4	22.3	3.4	0.5	<b>138.8</b>
<b>Percent (%)</b>	80.8	0.3	16.0	2.5	0.4	<b>100</b>

AC: asbestos cement or transite  
CI: cast iron

DI: ductile iron  
PVC: polyvinyl chloride

STL: steel

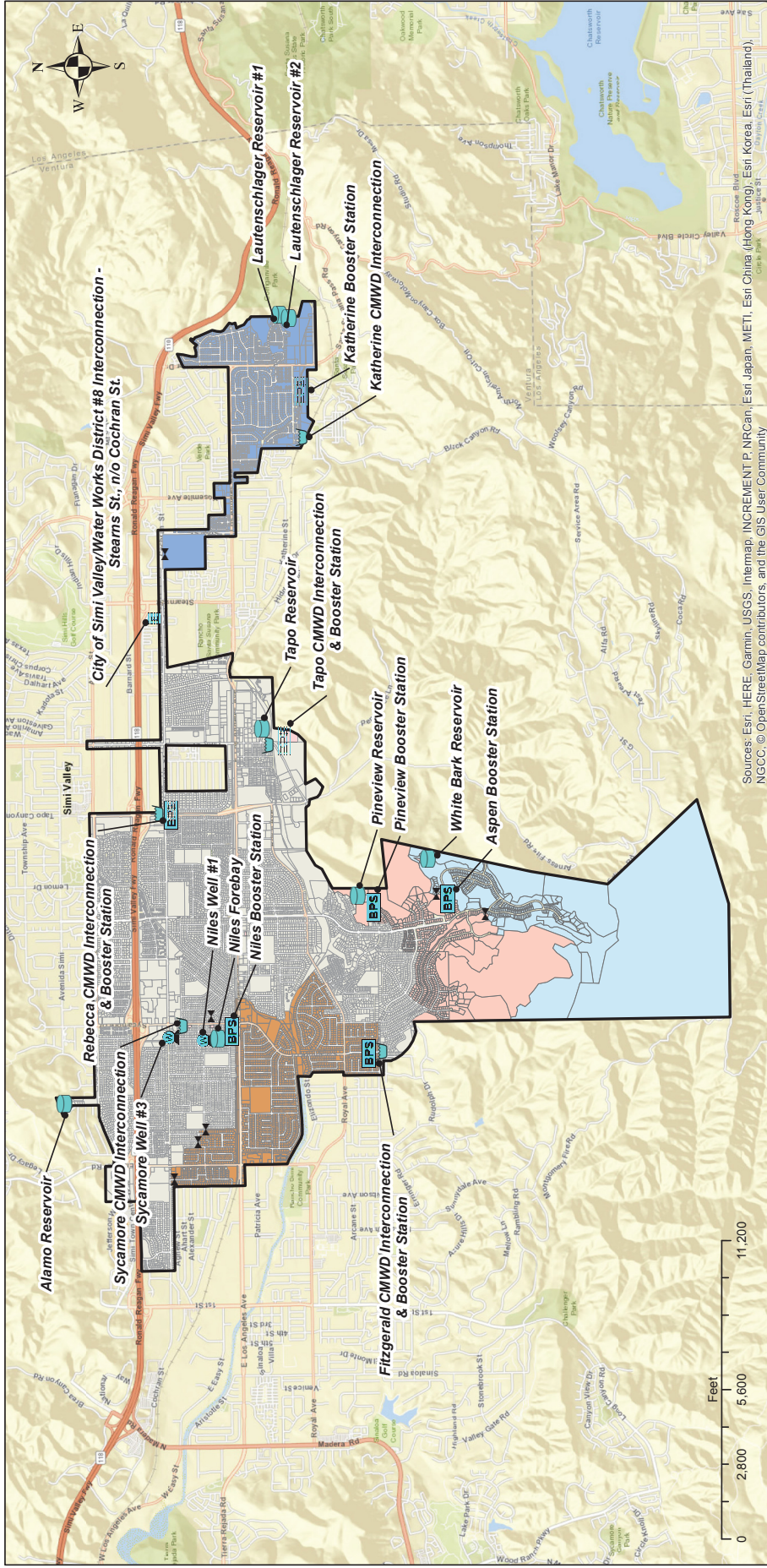
TABLE 2-10 lists the estimated footage of pipelines by diameter and year constructed.

TABLE 2-10 Pipes by Size and Year Built

Diameter (in)	Length of Pipe by Year Built (ft)				Total Length (ft)
	1960-1974	1975-1989	1990-2004	2005-2019	
2	-	40	-	-	<b>40</b>
4	18,130	12,535	760	53	<b>31,477</b>
6	208,625	74,735	9,886	561	<b>293,806</b>
8	130,348	53,680	43,570	25,028	<b>252,625</b>
10	43,406	18,845	577	31	<b>62,858</b>
12	11,836	20,103	18,499	24,953	<b>75,391</b>
14	2,650	-	-	-	<b>2,650</b>
16	8,618	3,131	978	178	<b>12,905</b>
24	-	633	158	28	<b>819</b>
<b>Totals (ft)</b>	423,612	183,702	74,428	50,831	<b>732,573</b>
<b>Totals (mi)</b>	80.2	34.8	14.2	9.6	<b>138.8</b>
<b>Percent (%)</b>	57.8	25.1	10.2	6.9	<b>100</b>





**Figures**

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





Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community


#### Existing Facilities

-  Booster Pump Station
-  Reservoir
-  Well
-  Regulating Valve


#### Pressure Zone

-  Alamo
-  Calleguas
-  Katherine
-  Pineview

#### Emergency Interconnection

- 

#### Imported Water Supply Connection

- 

#### White Bark

- 

#### Simi Valley System Boundary

- 

**FIGURE 2-1**

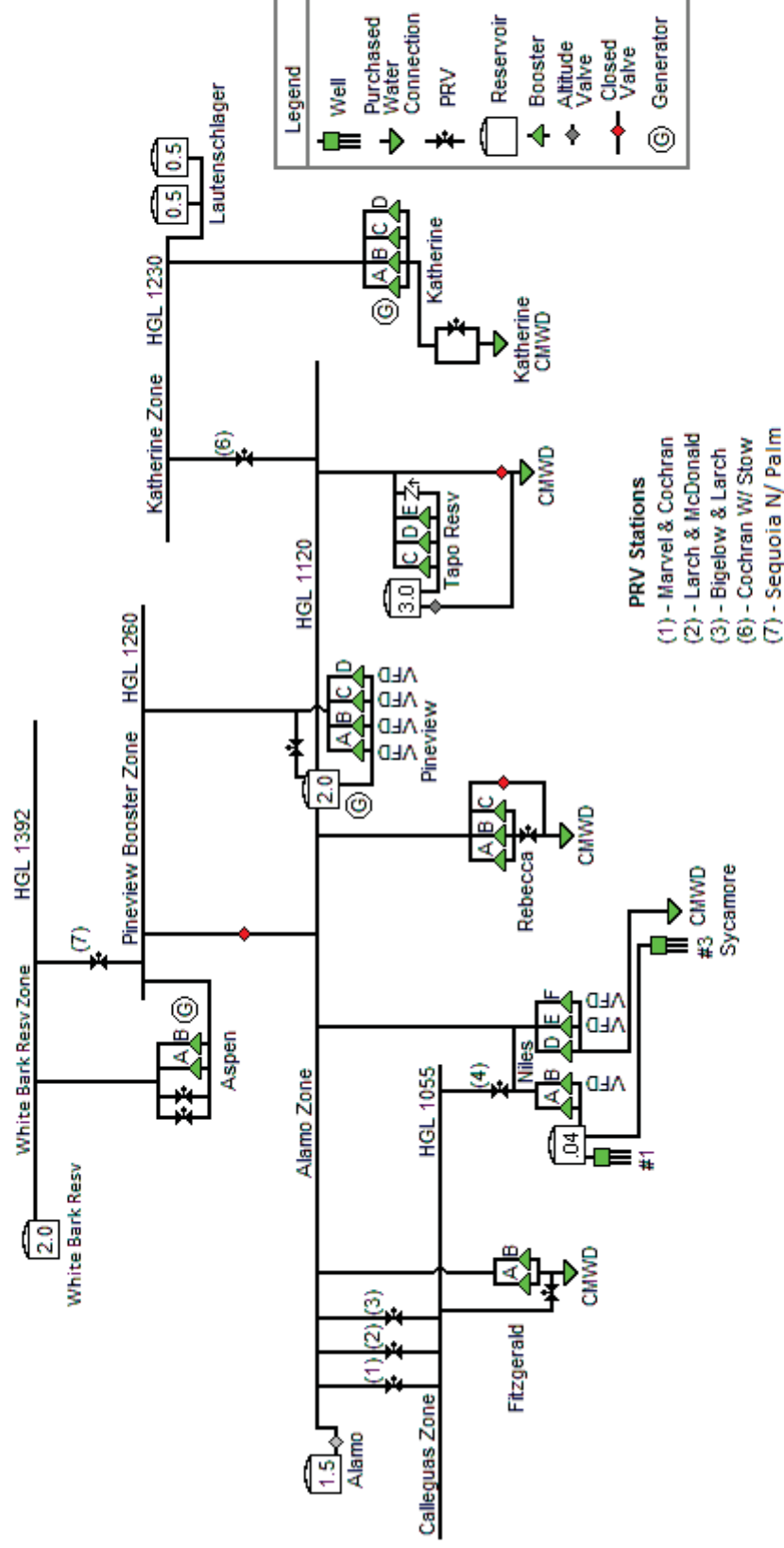
### MAJOR SYSTEM FACILITIES

GSWC REGION I WATER MASTER PLAN  
SIMI VALLEY SYSTEM



Last Update: 4/4/2019

# Simi Valley System Schematic



**FIGURE 2-2**  
**SYSTEM SCHEMATIC**  
 GSWC REGION I MASTER PLAN  
 SIMI VALLEY SYSTEM

## SECTION 3

# Existing and Future Water Demands

---

This section documents existing and future water demands for the system and contains the following information:

- Demand definitions and scenarios
- Existing demands
- Peaking factors
- Future demand projections

## 3.1 Demand Definitions and Periods

Demand is classified in two basic ways:

- Demand: The total quantity of water required for a given period of time to meet the water system's various uses. These uses may include residential, commercial, industrial, and other revenue and non-revenue demands.
- Non-revenue water: The difference between the total amount of water produced from water supply sources and the total amount of water delivered to customers. This includes water used for firefighting, flushing, water lost due to system leaks and illegal connections. For systems without meters for all customers, this demand classification may not be quantifiable.

The water industry commonly uses several demand periods for developing water distribution system master plans. These demand periods are designated as average day demand (ADD), maximum day demand (MDD), peak hour demand (PHD), and maximum day demand plus fire flow (MDD+FF), and were applied as necessary to evaluate the system. The American Water Works Association (AWWA, 2005) defines these common steady-state demand periods as follows:

- ADD: Total amount of water delivered to the system in 1 year divided by 365 days.
- MDD: Maximum amount of water delivered to the system in any single day of the year.
- PHD: Amount of water required to meet peak demands during MDD. GSWC applies PHD for four hours when analyzing system supply and storage.
- MDD+FF: Amount of water required to fight a fire in addition to MDD.

## 3.2 Existing Demands

The existing demands represent a baseline for evaluating the existing system and to project future demands. The data used to develop the existing demands was based on historical water production data provided by GSWC.

### 3.2.1 Historical Water Use

For this master plan, it was assumed that the historical water production equaled the historical water demand (including non-revenue water). TABLE 3-1 summarizes historical annual water production from 2009 through 2018. The average water demand per connection for this period was 0.488 acre-feet per year per connection (AFY/conn.).

TABLE 3-1 Historical Annual Water Production

Year	Active Service Connections	Total Demand (AFY)*	Average Demand per Connection (AFY/conn.)
2009	13,266	7,330	0.553
2010	13,296	6,513	0.490
2011	13,305	6,578	0.494
2012	13,297	7,005	0.527
2013	13,308	7,469	0.561
2014	13,354	7,174	0.537
2015	13,368	5,341	0.400
2016	13,476	5,526	0.410
2017	13,537	6,103	0.451
2018	13,611	6,220	0.457
<b>10-year average</b>			<b>0.488</b>

\* Includes non-revenue water use

FIGURE 3-1 summarizes the historical annual water production and number of active service connections. The figure demonstrates a correlation between the number of active service connections and the amount of water consumed. The average demand per connection varied between 0.400 and 0.561.

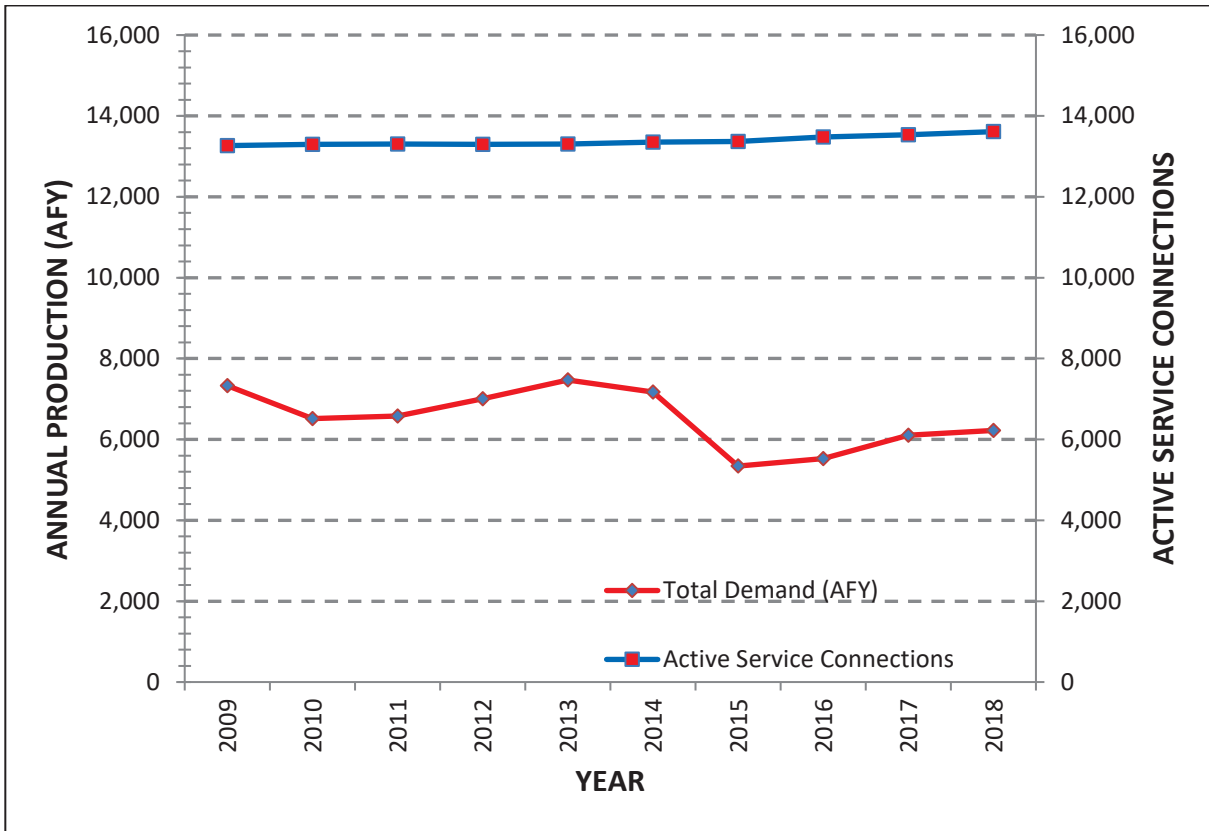


FIGURE 3-1 Historical Annual Production Totals and Active Service Connections for the Last 10 Years

### 3.2.2 Establishing Demands

The total water demand for existing conditions was estimated by multiplying the number of 2018 active service connections (13,611) with the 10-year average of the average demand per service connection (0.488 AFY/conn.), resulting in a system water demand of 6,641 AFY. Converting the system water demand to a daily demand produces an ADD of 4,117 gpm. This approach allows the calculation of ADD for various planning years, including the impact on anticipated growth, and then allows a direct calculation for other demand periods using the appropriate peaking factor.

To evaluate the system's performance during the MDD scenario, existing historical demand data were used in accordance with the Waterworks Standards set forth by the California Code of Regulations (2009). Section 64554.30 of the Waterworks Standards define MDD as "the amount of water utilized by customers during the highest day of use (midnight to midnight), excluding fire flow, as determined pursuant to Section 64554." Section 64554(b)(1) of the Waterworks Standards states "...identify the day with the highest usage during the past ten years to obtain MDD...". While GSWC is currently unable to track customer usage over an exact 24-hour period, GSWC does record daily water production – and, as stated in Master Plan Section 3.2.1, above, it can be "assumed that the historical water production equal[s] the historical water demand". However, because the daily

production reads are not taken at midnight or always collected at the same time each day, the resulting data may be for time periods that can range anywhere from 16 to 32 hours (depending on the time of day the production data are collected). For example, the readings may be taken at 9am one day and 4pm the next; this introduces the chance of a fairly large error if only the recording for a single day is used, as it could include water production over a period longer than 24 hours. To address the possible variations in the hours per day within a given production read, GSWC identifies and uses the average of the three consecutive days with the highest production for each calendar year. By utilizing the average of these highest three consecutive days of water production, the resulting number is normalized, reducing the effect of any imprecision due to the time of day when the data was collected.

Table 3-2 presents the ADD, MDD, and peaking factor data over the last ten years.

TABLE 3-2 Historical Average and Maximum Day Demand

Year	ADD <sup>a</sup>		MDD <sup>b</sup> (gpm)	MDD Peaking Factor (MDD:ADD)
	AFY	Gpm		
2009	7,330	4,544	6,258	1.38
2010	6,513	4,038	6,086	1.51
2011	6,578	4,078	6,170	1.51
2012	7,005	4,342	6,771	1.56
2013	7,469	4,630	6,658	1.44
2014	7,174	4,448	6,706	1.51
2015	5,341	3,311	4,921	1.49
2016	5,526	3,426	5,501	1.61
2017	6,103	3,783	5,564	1.47
2018	6,220	3,856	5,625	1.46

<sup>a</sup> Includes non-revenue water use

<sup>b</sup> Average of three consecutive highest days

Peaking factors are typically calculated as a ratio of the demand period to ADD. For example, to determine the MDD peaking factor you would divide the MDD by the ADD. Peaking factors are used to estimate future water demands as presented and discussed in Section 3.3. To determine the existing MDD, the Waterworks Standards state the following in Section 64554(b):

*A system shall estimate MDD and PHD for the water system as a whole (total source capacity and number of service connections) and for each pressure zone within the system (total water supply available from the water sources and interzonal transfers directly supplying the zone and number of service connections within the zone), as follows:*

- (1) *If daily water usage data are available, identify the day with the highest usage during the past ten years to obtain MDD; determine the average hourly flow during MDD and multiply by a peaking factor of at least 1.5 to obtain PHD.*

According to TABLE 3-2, the highest MDD during the past ten years was 6,771 gpm, which occurred in 2012. Multiplying the MDD by a peaking factor of 1.5 results in a PHD of 10,156 gpm. It has been GSWC's experience that utilizing a peaking factor of 1.5 has been sufficient to meet PHD. Projected system demands for the ADD, MDD, and PHD scenarios are summarized in TABLE 3-3.

TABLE 3-3 Projected System Demands by Demand Period

Demand Period	GPM
ADD	4,117
MDD	6,771
PHD	10,156

### 3.3 Future Demand Projections

Future demands were projected first to estimate future ADD, and then peaking factors were applied to estimate MDD and PHD. The following sources of data and approaches were used:

- Growth-rate projections
- Water-demand projections

#### 3.3.1 Growth Rate Projections

Growth rate projections were obtained from the 2015 Urban Water Master Plan (UWMP) for the Simi Valley System, and were based on estimates of the number of future service connections. The UWMP methodology used year 2010 U.S. Census data to correlate population growth with the increase in service connections. This correlation was then used to determine future water demand.

#### 3.3.2 Water Demand Projections

The projected annual water demands were obtained from the 2015 UWMP for the Simi Valley System and are based on the projected number of service connections. A factor for average water demand per connection was then applied, and state-mandated SBX7-7 reductions taken into account.

FIGURE 3-2 presents the historical and projected annual water demands, including the most recent 10-year period. Projections of future demands are slightly higher than the existing demand (2019) of 6,641 AFY.

The State of California is in a long term drought and the Governor has issued Executive Orders that will likely result in significant reductions in future demands. This Master Plan utilizes the current requirements established by the State of California and California Public Utilities Commission in evaluating needed facilities but acknowledges that the requirements may change. Subsequent updates to this Master Plan will reflect future changes in requirements.

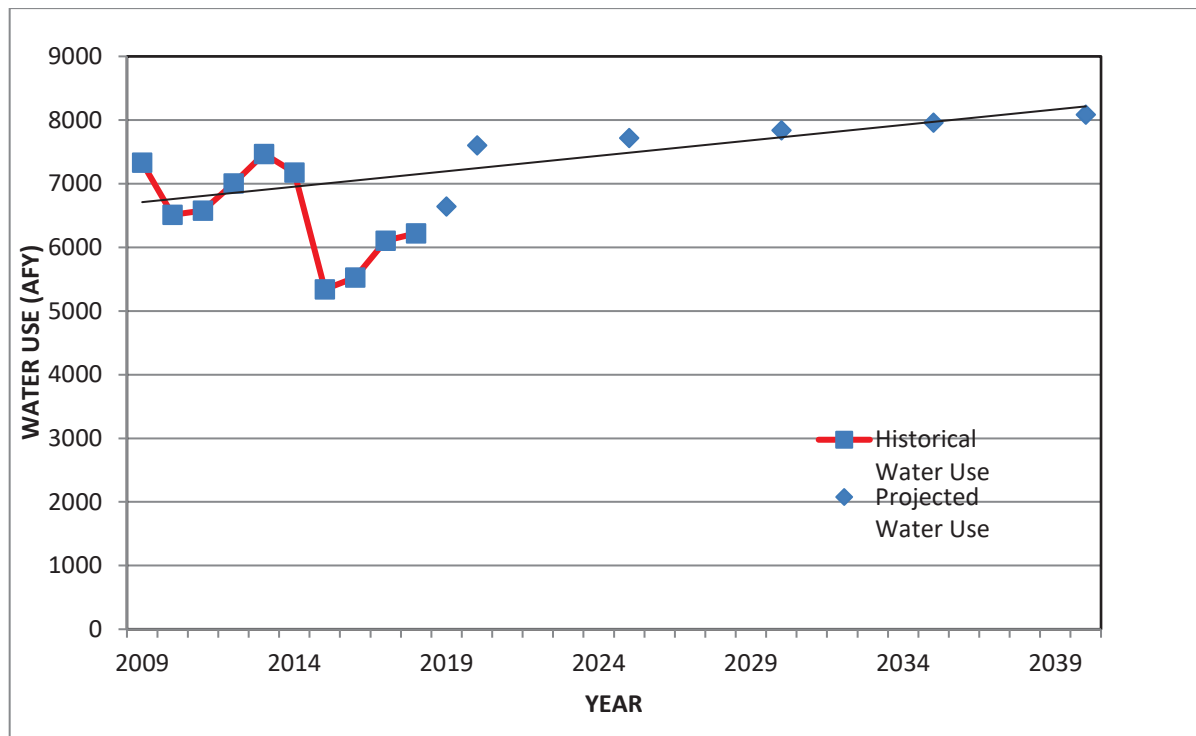


FIGURE 3-2 Historical Water Demand and Future Water Demand Projections

The water demands for 2040 project to be 8,084 AFY, resulting in an ADD of 5,014 gpm. To determine the projected MDD for year 2040, a peaking factor from TABLE 3-2 was applied to the projected ADD. The peaking factor associated with the highest MDD during the past ten years, 1.56 in 2012, was selected, resulting in a MDD of 7,821 gpm. A peaking factor of 1.5 was multiplied by the projected MDD to determine the projected PHD, which is 11,732 gpm. TABLE 3-4 summarizes the projected demands for ADD, MDD, and PHD periods.

TABLE 3-4 Water System Demands by Demand Period

Planning Year	Demand Period and Peaking Factor			
	Annual Average (AFY)	ADD (gpm)	MDD (gpm)	PHD (gpm)
2020	7,601	4,714	7,354	11,031
2040	8,084	5,014	7,821	11,732

# Hydraulic Model Development and Calibration

---

## 4.1 Overview

A computerized hydraulic model of a water distribution system is an important tool used as part of the Water Master Plan to conduct hydraulic analyses of the water system.

The computer model is used to analyze the facilities, operational characteristics, and water supply and consumption data of a water system. The water distribution system hydraulic model includes pipes, junction nodes (connection points for pipes and location of demands), valves, wells, pumps, purchased water connections, tanks, and reservoirs. Operational characteristics include parameters that control the method by which the water is distributed through the system, such as on and off settings for pumps, pressure or flow controls for hydraulically actuated valves, or main line valve closures. Data for supply and consumption determine where the water supply and demands are applied within the modeled distribution system.

Accurate computer model development begins with entering the correct information into the data file and calibrating the model to match existing conditions in the field. Once this foundation is complete, the resulting model becomes an invaluable tool. It can simulate the existing and future water system, identify system deficiencies, analyze impacts from increased demands, and determine the effectiveness of proposed improvements.

## 4.2 Construction and Calibration of the Hydraulic Computer Model

The Simi Valley System hydraulic computer model was revised as part of the 2016 Master Plan. For this Master Plan, the model was checked for accuracy and updated to include newly constructed facilities. Valve settings for pressure regulating valves were also verified, and the system demands were validated. Localized calibration was performed to refine the model in certain sections of the system.

## 4.3 Summary

This Master Plan update included verification of the physical components represented in the hydraulic model, validation of demands in the model, and localized field testing and calibration.

It is important to note that model calibration for any water system is an ongoing effort. As changes in the system occur from changing demands, new infrastructure development, or changing operational settings, the model must be periodically updated and checked to ensure agreement with field measurements. This update serves as a baseline for future calibration efforts by GSWC.

## SECTION 5

# Supply and Storage Capacity Evaluation

---

This section documents the evaluation of the water supply and storage capacity for the Simi Valley System. The evaluation results accomplished the following:

- Established storage needs for each pressure zone and the entire distribution system
- Identified supply and/or storage deficiencies in the existing and future systems
- Proposed improvements that mitigate the deficiencies identified

In each subsection, the supply and storage capacity of the existing and future water systems were measured against the objectives identified in the technical memorandum titled *Master Planning Criteria and Standards* (see Appendices). When the analysis indicated that the system did not meet these criteria, a deficiency was identified and facilities were proposed to mitigate the deficiency.

## 5.1 Overview

To provide a reliable water supply, a water system must be able to meet the system demands under a variety of conditions. The water supplied may be provided by a combination of supply sources, or stored water, or both. The specific demand period being analyzed may limit the source of water for the scenario. For example, stored water should not be used to meet ADD or MDD but could be used for PHD or MDD+FF. Therefore, each demand period may require a different ratio of water supplies and storage. This analysis examines various demand periods to determine if the system has the ability to reliably meet the system demands under typical demand scenarios using a combination of water supply sources and storage.

## 5.2 Evaluation Approach

This supply and storage capacity analysis examined the Simi Valley System under two planning periods:

- **Existing (2019) system.** The demands for the existing water system were determined by multiplying the 10 year historical average demand per connection and the most recent number of connections (year 2018) to obtain the total system demand. The analyses assumed all facilities that were operational in 2019.
- **2040 system.** The long-term planning horizon (2040) water system analysis assumed 2040 demands (assumed buildout) and facilities included in the existing system analysis plus facilities needed to correct deficiencies in 2040.

### 5.2.1 Analysis Criteria

The Simi Valley System must be capable of providing sufficient water supply and storage capacity to meet the minimum criteria summarized in TABLE 5-1. These criteria were extracted from the technical memorandum titled *Master Planning Criteria and Standards*.

The criteria apply to the system as a whole and to each pressure zone in the system. For planning purposes, this Master Plan utilizes the Planning Scenario ‘MDD + Fire Flow’ to analyze the system performance under a worst-case planning scenario. The worst-case planning scenario is represented by applying the single most stringent fire flow requirement established (based on land use plans or as designated by the local fire jurisdiction) for a structure within a hydraulic zone or planning area as the baseline fire flow requirement for the entire hydraulic zone or planning area. For the purposes of the planning analysis, this is considered a goal rather than a requirement. If the result of the worst case planning scenario indicates a deficiency in MDD + Fire Flow, it should be noted that there may not be a deficiency in the actual fire flow requirement for a particular structure, but rather that GSWC is not meeting the planning goal for the overall hydraulic zone or planning area.

TABLE 5-1 Supply and Storage Capacity Analysis Criteria

Planning Scenario	Demand and Duration	Evaluation Criterion	Storage Usage	Facilities Assumed to be Out of Service
Average day	ADD for 24 hours	Total capacity	No storage drawdown	-
Maximum day	MDD for 24 hours	Firm capacity	No storage drawdown	Largest pumping unit in system <sup>b</sup>
Peak hour	PHD for 4 hours <sup>1</sup>	Firm capacity	Operational storage	Largest pumping unit in system <sup>b</sup>
MDD + fire flow	MDD plus fire flow, duration varies <sup>2</sup>	Total capacity	Fire storage	-
Planned CMWD outage	ADD for 7 days	Total capacity without most critical CMWD connection or pipeline	Operational and emergency storage	Largest CMWD connection or pipeline <sup>3</sup>
Unplanned CMWD outage	MDD for 1 day followed by ADD for 6 days	Total capacity without most critical CMWD connection or pipeline	Operational and emergency storage	Largest CMWD connection or pipeline <sup>3</sup>

<sup>1</sup> Operational storage required to meet peak demands during MDD was defined as the supply needs during 4 hours of PHD.

<sup>2</sup> Fire flow scenarios are based on fire agency maximum flow requirements for a single structure within a planning area and are applied throughout the planning area as part of the planning analysis. Actual fire flows may be less than the maximum fire flow used for planning analysis.

<sup>3</sup> For the Planned and Unplanned MWD Outage scenarios, the largest CMWD pipeline – the CMWD North Feeder, which includes the Sycamore and Rebecca connections – is assumed to be out of service.

It is worth noting that the California Public Utilities Commission (CPUC) and State Water Resources Control Board, Division of Drinking Water (DDW) currently provide no specific requirements for storage volume. Therefore, recommended standards published by the American Water Works Association (AWWA) were considered in the development of the storage criteria used in this master plan.

## 5.2.2 Storage

In addition to providing adequate water supplies for the water consumers, water distribution systems often rely on stored water within the distribution system to provide the following operational benefits:

- Help equalize fluctuations between supply and demand.
- Supply sufficient water for firefighting.
- Meet demands during an emergency or unplanned outage of a major supply source.

AWWA defines three types of storage: operational, fire, and emergency. The amount of storage required for each of these types varies by system. Nevertheless, all three types of storage must be considered. In some cases, water stored in the groundwater basin can provide some of this storage. However, when the stored water does not flow by gravity and requires pumping, sufficient pumping redundancy and stand-by power generators must be provided if the storage source is to be considered reliable.

This analysis evaluates the ability of the system's storage facilities to meet the water system's storage requirements. The resulting volume must be allocated to the pressure zones where the demands exist, or to a neighboring zone (if there are pressure-regulating stations or check valves available that allow the water to flow into the neighboring zone). The water system must also be evaluated to determine if existing booster stations provide sufficient water to be pumped into the higher-pressure zones.

TABLE 5-2 presents the recommended operational, fire, and emergency storage criteria as defined by GSWC for the Simi Valley System.

TABLE 5-2 Criteria for Calculating Storage

Storage Category	GSWC Criteria
Operational	Storage volume to meet PHD in addition to MDD supply
Fire	Maximum recommended fire storage volume in the system
Emergency	ADD for 12 hours

### Operational Storage

The required volume of water for operational storage is determined by the volume needed for regulating the difference between the rate of supply and the daily variations (peaks) in water usage. This difference results in the lowest and highest operating levels in the reservoirs under normal conditions. The resulting volume must be allocated to either the pressure zone (where the demands exist) or to a higher-pressure zone (for use by the lower-pressure zone).

### Fire Storage

The volume of water required for firefighting is a function of the instantaneous flow rate required to fight the fire over the duration of the fire flow event as determined by the local fire jurisdiction. Consideration is also made to evaluate the number of fire flow events that may occur before the volume can be replenished. Further, the volume of water necessary to

fight a fire can be provided from water supply, water storage, or a combination thereof. For planning purposes, it is desirable and conservative to design the water system to have capacity within water tanks for the volume of water needed for firefighting; however, the fire storage in the tanks plus available supply in excess of MDD can be utilized to meet firefighting requirements. The fire-flow requirements listed in TABLE 5-3 were used to establish the flow rate and duration for each pressure zone; these criteria were used to identify the largest volume of water required for firefighting within each pressure zone (based on the land use in that zone and the flow rates and durations from TABLE 5-3). The resulting fire-flow volumes are shown in TABLE 5-3.

TABLE 5-3 Fire Storage Volumes

Land Use Category	Minimum Fire Flow Required (gpm)	Duration (hr)	Recommended Fire Storage Volume (MG)
Hospital, public facility, school	2,000	3	0.360
Commercial or business	2,000	3	0.360
Senior complex (Runkle Canyon) <sup>a</sup>	2,000	2	0.240
Multifamily residential	2,500	2	0.300
Single-family residential	1,250	2	0.150
Park, open space, or other	1,750	3	0.315

MG: million gallons

<sup>a</sup> Based on Ventura County Fire Protection District communication included in 2004 Water Supply Assessment.

For the Simi Valley System, it was assumed that only one fire event within the system would occur before storage tanks could recover. The lowest fire-flow volume (0.150 MG) is the result of a 1,250-gpm fire for duration of 2 hours (single-family residential land use). The largest fire-flow volume (0.360 MG) is the result of a 2,000-gpm fire for duration of 3 hours (industrial use).

### Emergency Storage

Emergency storage is a dedicated source of water that can be used as a backup supply in the event a major supply source is interrupted. This can be provided by water from a second independent source, by water stored in reservoirs, or a combination of both. *Ten States Standards* recommends that emergency storage total between 12 and 24 hours of ADD volume. Because the Simi Valley System contains multiple supply sources and storage reservoirs, 12 hours of ADD volume for this system is appropriate.

## 5.3 Existing System Evaluation

Evaluation of the existing system's supply and storage capacity involved analysis of key system facilities to identify supply or storage capacity deficiencies. This approach involved analyzing multiple proposed improvement alternatives to address these deficiencies. These proposed improvements were then evaluated to determine the most cost-effective alternatives, which would then be identified as the recommended improvements and incorporated into the CIP. The following subsections describe the existing system evaluation:

- Water demands for each demand period
- Supply facilities
- Storage facilities
- Capacity analysis
- Proposed improvements to address deficiencies in the existing system

### 5.3.1 Existing System Water Demands for Each Demand Period

TABLE 5-4 defines the existing demands by pressure zone for each demand period, based on spatial demand allocation from the Simi Valley GIS.

TABLE 5-4 Existing System Water Demands

Pressure Zone	ADD (gpm)	MDD (gpm)	PHD (gpm)	Demand by Zone (%)
White Bark Zone <sup>a</sup>	88	144	216	2
Pineview Booster Zone	199	327	490	5
Alamo Zone	2,730	4,490	6,735	66
Calleguas Zone	636	1,045	1,568	15
Katherine Zone	465	765	1,147	11
<b>Total</b>	<b>4,117</b>	<b>6,771</b>	<b>10,156</b>	<b>100</b>

<sup>a</sup> White Bark Zone is still under development; demand allocations based on CC&B data.

### 5.3.2 Existing System Supply Facilities

The existing water supply facilities in the Simi Valley System were identified in Section 2, Existing Water System Facilities. TABLE 5-5 summarizes the design production capacity of each supply source and systemwide totals for total capacity and firm capacity.

TABLE 5-5 Existing System Supply Facilities

Facility Name	Source	Pressure Zone	Total Capacity (gpm)
Niles Well #1	Groundwater	Alamo Zone	850
Sycamore Well #3	Groundwater	Alamo Zone	700
Tapo CMWD Connection	Purchased Water	Alamo Zone	3,500
Sycamore CMWD Connection	Purchased Water	Alamo Zone	8,000
Rebecca CMWD Connection	Purchased Water	Alamo Zone	3,500
Fitzgerald CMWD Connection	Purchased Water	Alamo Zone and Calleguas Zone	7,000
Katherine CMWD Connection	Purchased Water	Katherine Zone	3,000
<b>Systemwide total</b>			<b>26,550*</b>

\*Actual total capacity is limited by the booster capacity of each plant, as all well and CMWD water is re-boostered before entering the distribution system. Total booster capacity for all supply sources is 17,650 gpm.

### 5.3.3 Existing System Storage Facilities

The existing storage facilities in the Simi Valley System are described in Section 2, Existing Water System Facilities. TABLE 5-6 summarizes the storage facilities for the Simi Valley System.

TABLE 5-6 Existing System Storage Facilities

Facility Name	Primary Pressure Zone Served	Total Capacity (MG)
Alamo	Alamo Zone	1.50
Lautenschlager 1 (North)	Katherine Zone	0.50
Lautenschlager 2 (South)	Katherine Zone	0.50
Tapo	Pumped to Alamo Zone	3.00
Niles Forebay	Pumped to Alamo Zone	0.04
Pineview	Alamo Zone (pumped to Pineview Zone)	2.00
White Bark	White Bark Zone	2.00
<b>Total storage capacity</b>		<b>9.54</b>

### 5.3.4 Existing System Supply and Capacity Analysis

This analysis of the existing water distribution system evaluated the five pressure zones separately and then the system as a whole to verify that adequate supply and storage facilities were available. The analysis reviewed the demand periods (ADD, MDD, PHD, MDD+FF and both planned and unplanned MWD outages); the duration for each demand period is detailed in TABLE 5-1. The duration of MDD+FF was established by the fire-flow criteria identified in TABLE 5-3.

In the following subsections, an analysis is performed for each pressure zone and for the overall system. The demands and production capacities for each zone are presented in a table that summarizes the results. These tables present the demands for each demand period in the zone and for any zones that depend on this zone for supplies. These demands are presented as a flow rate and are converted into a demand volume using the duration for the demand period. For example, a demand of 100 gpm for ADD would be equal to a demand volume of 144,000 gallons, given that the duration of ADD is 24 hours.

Available supplies are presented below the demand volume totals. Available supplies include water supply sources, booster pumping capacity, and stored water. Stored water was not used to provide water supplies during ADD or MDD. Stored water that was allocated as operational storage was assumed to be available for PHD, and water stored for fire flows was assumed to be available for MDD+FF. The total supplies were assumed to be available for ADD and MDD+FF. For the purpose of assuring reliable water service is provided to customers, each zone's ability to meet MDD and PHD with firm capacity was analyzed. (Firm capacity was defined as the available capacity with the largest pumping unit out of service.) The available production was calculated by converting flow rates into a production volume (using the duration of the demand period) and adding the available storage volume.

The last two lines of the table compare the system's available production capacity to the demands for the same duration. Where production capacity exceeds demands, the row *supply minus demand* will be positive. This indicates an adequate combination of supplies and storage. Where this occurs, the last row of the table, *supply meets demand*, will contain *yes*. However, if demands exceed production, then the row *supply minus demand* will have a negative value, and the row *supply meets demand* will contain *no*. In this latter case, proposed improvements were evaluated to correct the deficiency.

### White Bark Zone Analysis

The White Bark Zone is still under development. Water supply to the White Bark Zone is provided by two boosters from the Pineview Booster Zone, via the Aspen Plant in-line booster station, as listed in TABLE 2-7. There is 2.0 MG storage in this pressure zone from the White Bark Reservoir. Fire flow was assumed to occur at only one place at a given time, and the maximum fire flow (0.240 MG) was assumed.

The overall capacity analysis for the White Bark Zone is presented in TABLE 5-7.

TABLE 5-7 Existing System Supply and Capacity Analysis—White Bark Zone

		Planning Scenario							
		ADD		MDD		PHD		MDD+FF	
Duration (Hours)		24		24		4		2	
Demand		GPM	MG	GPM	MG	GPM	MG	GPM	MG
White Bark Zone		88	0.127	144	0.207	216	0.052	2,144	0.257
Pineview Booster Zone	PRV	0	0.000	0	0.000	0	0.000	0	0.000
<b>Total Demand</b>		<b>88</b>	<b>0.127</b>	<b>144</b>	<b>0.207</b>	<b>216</b>	<b>0.052</b>	<b>2,144</b>	<b>0.257</b>
Supply Capacity									
Wells	N/A	-	-	-	-	-	-	-	-
Boosters	1,000	88	0.127	144	0.207	216	0.052	1,000	0.120
PRVs	N/A	-	-	-	-	-	-	-	-
Reservoirs	2.0	-	-	-	-	0	0.000	1,144	0.137
<b>Total Supply</b>		<b>88</b>	<b>0.127</b>	<b>144</b>	<b>0.207</b>	<b>216</b>	<b>0.052</b>	<b>2,144</b>	<b>0.257</b>
<b>Supply Minus Demand</b>		<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>
<b>Supply Meets Demand</b>		<b>YES</b>		<b>YES</b>		<b>YES</b>		<b>YES</b>	

		Planning Scenario					
		Planned MWD outage		Unplanned Outage - Day 1 (MDD)		Unplanned Outage - Days 2-7 (ADD)	
Duration (Hours)		168		24		144	
Demand		GPM	MG	GPM	MG	GPM	MG
White Bark Zone		88	0.887	144	0.877	88	0.877
Pineview Booster Zone	PRV	0	0.000	0	0.000	0	0.000
<b>Total Demand</b>		<b>88</b>	<b>0.887</b>	<b>144</b>	<b>0.207</b>	<b>88</b>	<b>0.760</b>
Supply Capacity							
Wells	N/A	-	-	-	-	-	-
Boosters	1,000	88	0.887	144	0.207	88	0.760
PRVs	N/A	-	-	-	-	-	-
Reservoirs	2.0	0	0.000	0	0.000	0	0.000
<b>Total Supply</b>		<b>88</b>	<b>0.887</b>	<b>144</b>	<b>0.207</b>	<b>88</b>	<b>0.760</b>

<b>Supply Minus Demand</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>
<b>Supply Meets Demand</b>	<b>YES</b>		<b>YES</b>		<b>YES</b>	

The existing system supply and storage capacity analysis results indicate that facilities in this pressure zone are adequate to meet the demands for all planning scenarios.

### Pineview Booster Zone Analysis

Water supply to the Pineview Booster Zone is provided by four boosters from the Pineview Tank, as listed in TABLE 2-7, and two PRV stations from the White Bark Zone, as listed in TABLE 2-8. There is no storage in this pressure zone. Fire flow was assumed to occur at only one place at a given time, and the maximum fire flow (0.150 MG) was assumed.

The overall capacity analysis for the Pineview Booster Zone is presented in TABLE 5-8.

TABLE 5-8 Existing System Supply and Capacity Analysis—Pineview Booster Zone

	Planning Scenario							
	ADD		MDD		PHD		MDD+FF	
Duration (Hours)	24		24		4		2	
Demand	GPM	MG	GPM	MG	GPM	MG	GPM	MG
Pineview Bstr Zone	199	0.287	327	0.471	490	0.118	1,577	0.189
White Bark Zone BP	88	0.127	144	0.207	216	0.052	144	0.017
<b>Total Demand</b>	<b>287</b>	<b>0.413</b>	<b>471</b>	<b>0.678</b>	<b>706</b>	<b>0.169</b>	<b>1,721</b>	<b>0.207</b>
Supply Capacity								
Boosters 2,500	287	0.413	471	0.678	706	0.169	1,721	0.207
PRVs 1,800	0	0.000	0	0.000	0	0.000	0	0.000
<b>Total Supply</b>	<b>287</b>	<b>0.413</b>	<b>471</b>	<b>0.678</b>	<b>706</b>	<b>0.169</b>	<b>1,721</b>	<b>0.207</b>
<b>Supply Minus Demand</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>
<b>Supply Meets Demand</b>	<b>YES</b>		<b>YES</b>		<b>YES</b>		<b>YES</b>	

	Planning Scenario					
	Planned MWD outage		Unplanned Outage - Day 1 (MDD)		Unplanned Outage - Days 2-7 (ADD)	
Duration (Hours)	168		24		144	
Demand	GPM	MG	GPM	MG	GPM	MG
Pineview Bstr Zone	199	2.006	327	0.471	199	1.719
White Bark Zone BP	88	0.887	144	0.207	88	0.760
<b>Total Demand</b>	<b>287</b>	<b>2.893</b>	<b>471</b>	<b>0.678</b>	<b>287</b>	<b>2.480</b>
Supply Capacity						
Boosters 2,500	287	2.893	471	0.678	287	2.480
PRVs 1,800	0	0.000	0	0.000	0	0.000
<b>Total Supply</b>	<b>287</b>	<b>2.893</b>	<b>471</b>	<b>0.678</b>	<b>287</b>	<b>2.480</b>
<b>Supply Minus Demand</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>
<b>Supply Meets Demand</b>	<b>YES</b>		<b>YES</b>		<b>YES</b>	

The existing system supply and storage capacity analysis results indicate that facilities in this pressure zone are adequate to meet the demands for all planning scenarios.

### Alamo Zone Analysis

Water supply to the Alamo Zone is provided by 13 boosters (all well and CMWD water in the Simi Valley System is re-boostered before entering the distribution system), as listed in TABLE 2-7. There is 6.54 MG storage in this pressure zone from the Alamo Reservoir, the Niles Forebay, the Pineview Reservoir, and the Tapo Reservoir. Fire flow was assumed to occur at only one place at a given time, and the maximum fire flow (0.360 MG) was assumed. For the Planned and Unplanned MWD Outage scenarios, the largest CMWD pipeline – the CMWD North Feeder, which includes the Sycamore and Rebecca connections – was assumed to be out of service.

The overall capacity analysis for the Alamo Zone is presented in TABLE 5-9.

TABLE 5-9 Existing System Supply and Capacity Analysis—Alamo Zone

		Planning Scenario							
		ADD		MDD		PHD		MDD+FF	
Duration (Hours)		24		24		4		3	
Demand		GPM	MG	GPM	MG	GPM	MG	GPM	MG
Alamo Zone		2,730	3.931	4,490	6.466	6,735	1.616	6,490	1.168
Calleguas Zone	PRV	636	0.916	1,045	1.505	1,568	0.376	1,045	0.188
Pineview Bstr Zone	BP	287	0.413	471	0.678	706	0.169	471	0.085
<b>Total Demand</b>		<b>3,653</b>	<b>5.260</b>	<b>6,006</b>	<b>8.649</b>	<b>9,009</b>	<b>2.162</b>	<b>8,006</b>	<b>1.441</b>
Supply Capacity									
Boosters	15,950	3,653	5.260	6,006	8.649	8,250	1.980	8,006	1.441
PRVs	1,565	0	0.000	0	0.000	0	0.000	0	0.000
Reservoirs	6.5	-	-	-	-	759	0.182	0	0.000
<b>Total Supply</b>		<b>3,653</b>	<b>5.260</b>	<b>6,006</b>	<b>8.649</b>	<b>9,009</b>	<b>2.162</b>	<b>8,006</b>	<b>1.441</b>
<b>Supply Minus Demand</b>		<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>
<b>Supply Meets Demand</b>		<b>YES</b>		<b>YES</b>		<b>YES</b>		<b>YES</b>	

		Planning Scenario					
		Planned MWD outage		Unplanned Outage - Day 1 (MDD)		Unplanned Outage - Days 2-7 (ADD)	
Duration (Hours)		168		24		144	
Demand		GPM	MG	GPM	MG	GPM	MG
Alamo Zone		2,730	27.518	4,490	6.466	2,730	23.587
Calleguas Zone	PRV	636	6.411	1,045	1.505	636	5.495
Pineview Bstr Zone	BP	287	2.893	471	0.678	287	2.480
<b>Total Demand</b>		<b>3,653</b>	<b>36.822</b>	<b>6,006</b>	<b>8.649</b>	<b>3,653</b>	<b>31.562</b>
Supply Capacity							
Boosters	15,950	3,653	36.822	4,800	6.912	3,653	31.562
PRVs	1,565	0	0.000	1,206	1.737	0	0.000
Reservoirs	6.5	0	0.000	0	0	0	0.000
<b>Total Supply</b>		<b>3,653</b>	<b>36.822</b>	<b>6,006</b>	<b>8.649</b>	<b>3,653</b>	<b>31.562</b>
<b>Supply Minus Demand</b>		<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>
<b>Supply Meets Demand</b>		<b>YES</b>		<b>YES</b>		<b>YES</b>	

The existing system supply and storage capacity analysis results indicate that facilities in this pressure zone are adequate to meet the demands for all planning scenarios.

### Calleguas Zone Analysis

Water supply to the Calleguas Zone is provided by three PRVs from the Alamo Zone (and an additional PRV from the Niles Plant/Alamo Zone) and a PRV from the Fitzgerald CMWD Connection, as listed in TABLE 2-8. Fire flow was assumed to occur at only one place at a given time, and the maximum fire flow (0.360 MG) was assumed.

The overall capacity analysis for the Calleguas Zone is presented in TABLE 5-10.

TABLE 5-10 Existing System Supply and Capacity Analysis—Calleguas Zone

	Planning Scenario							
	ADD		MDD		PHD		MDD+FF	
Duration (Hours)	24		24		4		3	
Demand	GPM	MG	GPM	MG	GPM	MG	GPM	MG
Calleguas Zone	636	0.916	1,045	1.505	1,568	0.376	3,045	0.548
<b>Total Demand</b>	<b>636</b>	<b>0.916</b>	<b>1,045</b>	<b>1.505</b>	<b>1,568</b>	<b>0.376</b>	<b>3,045</b>	<b>0.548</b>
Supply Capacity								
PRVs 3,930	636	0.916	1,045	1.505	1,568	0.376	3,045	0.548
<b>Total Supply</b>	<b>636</b>	<b>0.916</b>	<b>1,045</b>	<b>1.505</b>	<b>1,568</b>	<b>0.376</b>	<b>3,045</b>	<b>0.548</b>
<b>Supply Minus Demand</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>
<b>Supply Meets Demand</b>	<b>YES</b>		<b>YES</b>		<b>YES</b>		<b>YES</b>	

	Planning Scenario					
	Planned MWD outage		Unplanned Outage - Day 1 (MDD)		Unplanned Outage - Days 2-7 (ADD)	
Duration (Hours)	168		24		144	
Demand	GPM	MG	GPM	MG	GPM	MG
Calleguas Zone	636	6.411	1,045	1.505	636	5.495
<b>Total Demand</b>	<b>636</b>	<b>6.411</b>	<b>1,045</b>	<b>1.505</b>	<b>636</b>	<b>5.495</b>
Supply Capacity						
PRVs 3,930	636	6.411	1,045	1.505	636	5.495
<b>Total Supply</b>	<b>636</b>	<b>6.411</b>	<b>1,045</b>	<b>1.505</b>	<b>636</b>	<b>5.495</b>
<b>Supply Minus Demand</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>
<b>Supply Meets Demand</b>	<b>YES</b>		<b>YES</b>		<b>YES</b>	

The existing system supply and storage capacity analysis results indicate that facilities in this pressure zone are adequate to meet the demands for all planning scenarios.

### Katherine Zone Analysis

Water supply to the Katherine Zone is provided by four boosters from the Katherine CMWD interconnection, as listed in TABLE 2-7. There is 1.0 MG storage in this pressure zone from the Lautenschlager Reservoir 1 and the Lautenschlager Reservoir 2. Fire flow was assumed to occur at only one place at a given time, and the maximum fire flow (0.360 MG) was assumed.

The overall capacity analysis for the Katherine Zone is presented in TABLE 5-11.

TABLE 5-11 Existing System Supply and Capacity Analysis—Katherine Zone

	Planning Scenario							
	ADD		MDD		PHD		MDD+FF	
Duration (Hours)	24		24		4		3	
Demand	GPM	MG	GPM	MG	GPM	MG	GPM	MG
Katherine Zone	465	0.670	765	1.102	1,147	0.275	2,765	0.498
Alamo Zone PRV	0	0.000	0	0.000	0	0.000	0	0.000
<b>Total Demand</b>	<b>465</b>	<b>0.670</b>	<b>765</b>	<b>1.102</b>	<b>1,147</b>	<b>0.275</b>	<b>2,765</b>	<b>0.498</b>
Supply Capacity								
Boosters 1,700	465	0.670	765	1.102	1,147	0.275	1,700	0.306
Reservoirs 1.0	-	-	-	-	0	0.000	1,065	0.192
<b>Total Supply</b>	<b>465</b>	<b>0.670</b>	<b>765</b>	<b>1.102</b>	<b>1,147</b>	<b>0.275</b>	<b>2,765</b>	<b>0.498</b>
<b>Supply Minus Demand</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>
<b>Supply Meets Demand</b>	<b>YES</b>		<b>YES</b>		<b>YES</b>		<b>YES</b>	

	Planning Scenario					
	Planned MWD outage		Unplanned Outage - Day 1 (MDD)		Unplanned Outage - Days 2-7 (ADD)	
Duration (Hours)	168		24		144	
Demand	GPM	MG	GPM	MG	GPM	MG
Katherine Zone	465	4.687	765	1.102	465	4.018
Alamo Zone PRV	0	0.000	1,206	1.737	0	0.000
<b>Total Demand</b>	<b>465</b>	<b>4.687</b>	<b>1,971</b>	<b>2.838</b>	<b>465</b>	<b>4.018</b>
Supply Capacity						
Boosters 1,700	465	4.687	1,700	2.448	465	4.018
Reservoirs 1.0	0	0.000	271	0.391	0	0.000
<b>Total Supply</b>	<b>465</b>	<b>4.687</b>	<b>1,971</b>	<b>2.839</b>	<b>465</b>	<b>4.018</b>
<b>Supply Minus Demand</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.001</b>	<b>0</b>	<b>0.000</b>
<b>Supply Meets Demand</b>	<b>YES</b>		<b>YES</b>		<b>YES</b>	

\*The Katherine Plant can be fed from the CMWD North or the South Feeder, so the booster station is not assumed offline during Planned or Unplanned Outage scenarios.

The existing system supply and storage capacity analysis results indicate that facilities in this pressure zone are adequate to meet the demands for all planning scenarios.

### Systemwide Capacity Analysis

In the systemwide analysis, all supply and storage facilities were included. The total existing demands are presented in TABLE 5-4. The total and firm production capacities in TABLE 5-5 and the storage facilities in TABLE 5-6 were used for the appropriate demand periods. The fire flow used for MDD+FF was based on the largest fire flow in the system, a 2,000-gpm fire flow for 3-hour duration.

The results of the systemwide supply and storage analysis for the existing system are summarized in TABLE 5-12.

TABLE 5-12 Existing System Supply and Capacity Analysis—Systemwide

	Planning Scenario							
	ADD		MDD		PHD		MDD+FF	
Duration (Hours)	24		24		4		3	
Demand	GPM	MG	GPM	MG	GPM	MG	GPM	MG
<b>Total Demand</b>	<b>4,118</b>	<b>5.930</b>	<b>6,771</b>	<b>9.750</b>	<b>10,156</b>	<b>2.437</b>	<b>8,771</b>	<b>1.579</b>
Supply Capacity								
Boosters (Wells & MWD) 17,650	4,118	5.930	6,771	9.750	10,156	2.437	8,771	1.579
Reservoirs 9.54	0	0.000	0	0.000	0	0.000	0	0.000
<b>Total Supply</b>	<b>4,118</b>	<b>5.930</b>	<b>6,771</b>	<b>9.750</b>	<b>10,156</b>	<b>2.437</b>	<b>8,771</b>	<b>1.579</b>
<b>Supply Minus Demand</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>
<b>Supply Meets Demand</b>	<b>YES</b>		<b>YES</b>		<b>YES</b>		<b>YES</b>	

	Planning Scenario					
	Planned MWD outage		Unplanned Outage - Day 1 (MDD)		Unplanned Outage - Days 2-7 (ADD)	
Duration (Hours)	168		24		144	
Demand	GPM	MG	GPM	MG	GPM	MG
<b>Total Demand</b>	<b>4,118</b>	<b>41.509</b>	<b>6,771</b>	<b>9.750</b>	<b>4,118</b>	<b>35.580</b>
Supply Capacity						
Boosters (Wells & MWD) 17,650	4,118	41.509	6,500	9.360	4,118	35.580
Reservoirs 9.54	0	0.000	271	0.391	0	0.000
<b>Total Supply</b>	<b>4,118</b>	<b>41.509</b>	<b>6,771</b>	<b>9.751</b>	<b>4,118</b>	<b>35.580</b>
<b>Supply Minus Demand</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.001</b>	<b>0</b>	<b>0.000</b>
<b>Supply Meets Demand</b>	<b>YES</b>		<b>YES</b>		<b>YES</b>	

The systemwide supply and storage analysis results for the existing system indicate that the existing supply meets the demands for all planning scenarios.

### 5.3.5 Existing System Storage Analysis

The analysis of the existing storage facilities evaluated the required storage for each pressure zone and compared it to the existing storage available for each zone to determine the storage deficiencies. The benefits of storage and the types of storage (operational, fire, and emergency) are described in more detail in section 5.2.2.

TABLE 5-13 evaluates the three types of storage to calculate the total required storage for each zone and the entire system. The operational storage is calculated by subtracting the MDD from the PHD to obtain the additional flowrate that is required during the PHD scenario. This additional flowrate is multiplied by the duration of PHD and then converted to a volume to determine the required operational storage. A duration of four hours was used to account for the typical duration of peak demands during the day. The fire storage for each zone is based on criteria given in section 5.2.2. In cases where two or more pressure

zones retain their fire storage in the same reservoir, that reservoir only needs to contain the fire storage for the zone with the largest recommended fire storage volume. This is because the criteria consider only one fire flow can occur in the system at any given time. To prevent accounting for excess fire storage, pressure zones were given a fire storage total of 0.630 MG in TABLE 5-13 when fire storage of larger or equal size was used in another zone that retains its fire storage in the same tank. The emergency storage is the volumetric measurement of the ADD over a duration of 12 hours.

Storage deficiencies are identified for each zone in TABLE 5-14. All tanks in the existing system are listed in the left column of the table. All pressure zones in the existing system are listed in the top row of the table. The numbers in the table represent the allotted amount of storage, in millions of gallons, for each zone from each tank. A dash in the table denotes storage from that tank is unavailable for that zone. Zones that are able to utilize storage in a tank, but are not allotted any storage from it are shown in the table as zero. Summing the numbers across the rows results in the total storage volume of the tank listed in the left column of that row. Summing the numbers going down the columns results in the available storage for the zone listed in the top row of that column. The required storage, taken from TABLE 5-13, is given in the row below the available storage. Subtracting the required storage from the available storage within a column results in the excess storage for that column's zone. Negative numbers imply a storage deficiency and are given a "NO" in the adequate storage column. A "YES" in the adequate storage column implies there is adequate storage available for that zone. Fire storage is calculated to supplement supply when the supply is less than the current demand plus fire flow (see Section 5.3.4). Fire storage requirements are planning standards and fire storage is typically only required in times of high demands, supply limitations, and/or emergencies.

TABLE 5-13 Existing System Storage Analysis - Calculated Storage

	Zones					
	White Bark	Pineview Booster	Alamo	Calleguas	Katherine	Systemwide
<b>Operational</b>						
PHD	216	490	6735	1568	1147	10,156
MDD	144	327	4490	1045	765	6,771
PHD minus MDD	72	163	2,245	523	382	3,385
Duration	4	4	4	4	4	4
MG	0.017	0.039	0.539	0.125	0.092	0.813
<b>Fire</b>						
GPM	1250	1250	2000	2000	2000	-
Duration	2	2	3	3	3	-
MG*	0.150	0.000	0.360	0.000	0.360	0.870
<b>Emergency</b>						
ADD	88	199	2730	636	465	4,117
Duration	12	12	12	12	12	12
MG	0.063	0.143	1.966	0.458	0.335	2.964
<b>Total Recommended Storage</b>	<b>0.230</b>	<b>0.182</b>	<b>2.865</b>	<b>0.583</b>	<b>0.786</b>	<b>4.647</b>

\* A fire storage total of zero indicates that fire storage of larger or equal size was used in another zone that receives its fire storage from the same tank.

NOTE: All demand period scenarios (ADD, MDD, and PHD) are given in gallons per minute (GPM). All durations are given in hours. The rows titled "MG" and the total required storage are given in million gallons (MG)

TABLE 5-14 Existing System Storage Analysis - Adequacy Evaluation

	Zones					
	White Bark	Pineview Booster	Alamo	Calleguas	Katherine	Total
<b>Alamo Reservoir</b>	-	-	1.500	-	-	1.500
<b>Lautenschlager 1 Reservoir</b>	-	-	-	-	0.500	0.500
<b>Lautenschlager 2 Reservoir</b>	-	-	-	-	0.500	0.500
<b>Niles Reservoir</b>	-	-	0.040	-	-	0.040
<b>Pineview Reservoir</b>	-	-	1.417	0.583	-	2.000
<b>White Bark Reservoir</b>	1.818	0.182	-	-	-	2.000
<b>Tapo Reservoir</b>	-	-	3.000	-	-	3.000
<b>Available Storage</b>	1.818	0.182	5.957	0.583	1.000	9.540
<b>Recommended Storage*</b>	0.230	0.182	2.865	0.583	0.786	4.647
<b>Available Minus Recommended</b>	1.588	0.000	3.092	0.000	0.214	4.893
<b>Adequate Storage</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>

\* Recommended Storage numbers are from Table 5-12

NOTE: All numbers given are in million gallons (MG)

The existing system storage analysis results indicate no storage deficiency.

### 5.3.6 Proposed Improvements to Address Deficiencies in the Existing System

Various alternatives were considered while investigating improvements to correct the deficiencies identified in the supply and storage evaluation; these are listed in TABLE 5-15. Deficiencies may be corrected by adding supply, storage, or a combination of both. In these cases, the deficiency is shown in both supply (gpm) and storage (MG). The descriptions of the deficiency alternatives are given at the end of TABLE 5-15.

There were no deficiencies identified in the supply and storage evaluation.

The numbering system used in TABLE 5-15 is a series of three numbers. The first number indicates the planning period: 1 for the existing system and 2 for the 2040 system. The second number indicates the deficiency number, which starts at 1 and increments by 1 for each deficiency identified. The third number identifies the improvement alternative, but zero is reserved for the deficiency. Therefore, the alternative number 1.2.3 would be used to identify the third proposed alternative for the second deficiency in the existing system.

TABLE 5-15 Existing System Proposed Supply and Storage Improvements

Deficiency/ Alternative Number	Deficiency/Alternative Description	Pressure Zone	Supply Capacity (gpm)	Storage Capacity (MG)
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Deficiency/ Alternative Number	Deficiency/Alternative Description	Pressure Zone	Supply Capacity (gpm)	Storage Capacity (MG)
-	-	-	-	-

### 5.3.7 Recommended Improvements to Address Deficiencies in the Existing System

No deficiencies were identified in the Simi Valley System.

TABLE 5-16 Existing System Recommended Supply and Storage Improvements

Alternative Number	Alternative Description	Deficiencies Resolved	Supply/Storage Capacity
-	-	-	-

## 5.4 2040 System Evaluation

Analysis of the water system for the year 2040 was performed to identify long-term improvements needed for the water system at buildout. This analysis included the following assumptions:

- Existing supply sources would remain active or be replaced in kind.
- Planned improvements to address existing system deficiencies plus the post-2016 improvements are operational.
- The demands developed in Section 3, Existing and Future Water Demands, were assumed for the respective demand periods.

### 5.4.1 2040 System Water Demands for Each Demand Period

TABLE 5-17 defines the 2040 demands for the Simi Valley System. The demands are not provided for each pressure zone because it is unknown how much each zone's demands will increase by the year 2040.

TABLE 5-17 2040 System Water Demands

	ADD (gpm)	MDD (gpm)	PHD (gpm)
Systemwide	5,014	7,821	11,732

### 5.4.2 2040 System Supply Facilities

The supply facilities for the 2040 system include all supply facilities in the existing system along with all recommended supply facilities to resolve the existing system's deficiencies. TABLE 5-18 summarizes the supply for the 2040 System.

TABLE 5-18 2040 System Assumed Supply Facilities

Facility Name	Total Capacity (gpm)
Additional facilities in the 2040 System	0
Existing supply – Wells	1,550
Existing supply – MWD	25,000
<b>Total production capacity for 2040</b>	<b>26,550*</b>

\*Actual total capacity is limited by the booster capacity of each plant, as all well and CMWD water is re-boostered before entering the distribution system. Total booster capacity for all supply sources is 17,650 gpm.

### 5.4.3 2040 System Storage Facilities

The storage facilities for the 2040 system include all storage facilities in the existing system along with all recommended storage facilities to resolve the existing system's deficiencies. TABLE 5-19 summarizes the storage for the 2040 System.

TABLE 5-19 2040 System Assumed Storage Facilities

Facility Name	Primary Pressure Zone Served	Total Capacity (MG)
Recommended storage facilities	-	0
Existing storage	Systemwide	9.54
<b>Total storage capacity</b>		<b>9.54</b>

### 5.4.4 2040 System Capacity Analysis

The supply analysis for the 2040 system uses the 2040 projected demands and includes the recommended 2040 supply improvements to analyze system deficiencies. An analysis is not given for each pressure zone because it is unknown how much each zone's demands will increase by year 2040. The supply analysis is given in TABLE 5-20.

TABLE 5-20 2040 System Supply and Capacity Analysis—Systemwide

	Planning Scenario							
	ADD		MDD		PHD		MDD+FF	
Duration (Hours)	24		24		4		3	
Demand	GPM	MG	GPM	MG	GPM	MG	GPM	MG
<b>Total Demand</b>	<b>5,014</b>	<b>7.220</b>	<b>7,821</b>	<b>11.262</b>	<b>11,732</b>	<b>2.816</b>	<b>9,821</b>	<b>1.768</b>
Supply Capacity								
Boosters (Wells & MWD) 17,650	5,014	7.220	7,821	11.262	11,732	2.816	9,821	1.768
Reservoirs 9.54	0	0.000	0	0.000	0	0.496	0	0.000
<b>Total Supply</b>	<b>5,014</b>	<b>7.220</b>	<b>7,821</b>	<b>11.262</b>	<b>11,732</b>	<b>2.816</b>	<b>9,821</b>	<b>1.768</b>
<b>Supply Minus Demand</b>	<b>0</b>	<b>0.001</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.000</b>
<b>Supply Meets Demand</b>	<b>YES</b>		<b>YES</b>		<b>YES</b>		<b>YES</b>	

	Planning Scenario
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	<b>Planned MWD outage</b>		<b>Unplanned Outage - Day 1 (MDD)</b>		<b>Unplanned Outage - Days 2-7 (ADD)</b>	
Duration (Hours)	168		24		144	
Demand	GPM	MG	GPM	MG	GPM	MG
<b>Total Demand</b>	<b>5,014</b>	<b>50.537</b>	<b>7,821</b>	<b>11.262</b>	<b>5,014</b>	<b>43.317</b>
Supply Capacity						
Boosters (Wells & MWD) 17,650	5,014	50.541	6,500	9.361	5,014	43.321
Reservoirs 9.54	0	0.000	1,321	1.902	0	0.000
<b>Total Supply</b>	<b>5,014</b>	<b>50.541</b>	<b>7,821</b>	<b>11.263</b>	<b>5,014</b>	<b>43.321</b>
<b>Supply Minus Demand</b>	<b>0</b>	<b>0.004</b>	<b>0</b>	<b>0.000</b>	<b>0</b>	<b>0.004</b>
<b>Supply Meets Demand</b>	<b>YES</b>		<b>YES</b>		<b>YES</b>	

The systemwide supply and storage analysis results for the 2040 system indicate that the supply meets the demands for all planning scenarios.

#### 5.4.5 2040 System Storage Analysis

The storage analysis for the 2040 system uses the 2040 projected demands and includes the recommended supply and storage improvements for the existing system to analyze system deficiencies. Like the 2040 supply analysis, each pressure zone is not analyzed because it is unknown how much each zone's demands will increase by year 2040. The storage analysis is given in TABLE 5-21.

TABLE 5-21 2040 System Storage Analysis

<b>Scenario</b>		<b>Systemwide</b>
<b>Operational</b>	PHD	11,732
	MDD	7,821
	PHD minus MDD	3,911
	Duration	4
	MG	0.939
<b>Fire</b>	GPM	2,000
	Duration	3
	MG*	0.360
<b>Emergency</b>	ADD	5,014
	Duration	12
	MG	3.610
Total Recommended Storage		4.908
Available Storage in 2040		9.540
Available minus Recommended		4.632
<b>Adequate Storage</b>		<b>YES</b>

The 2040 system storage analysis results indicate no storage deficiency.

#### 5.4.6 Proposed Improvements to Address Deficiencies in the 2040 System

No deficiencies were identified for the 2040 system, as shown in TABLE 5-22.

TABLE 5-22 2040 System Proposed Supply and Storage Improvements

Deficiency/ Alternative Number	Deficiency/Alternative Description	Pressure Zone	Supply Capacity (gpm)	Storage Capacity (MG)
-	-	-	-	-

### 5.4.7 Recommended Improvements to Address Deficiencies in the 2040 System

No deficiencies were identified for the 2040 system, as shown in TABLE 5-23.

TABLE 5-23 2040 System Recommended Supply and Storage Improvements

Alternative Number	Alternative Description	Deficiencies Resolved	Supply/Storage Capacity
-	-	-	-

## 5.5 Summary of Proposed Supply and Storage Improvements through 2040

According to the supply and capacity analysis results in this Master Plan, the following additional supply is necessary to meet future demands:

- Existing system: no additional supply
- 2040 system: no additional supply

According to the storage analysis results in this Master Plan, the following additional storage is necessary to meet future demands:

- Existing system: no additional storage
- 2040 system: no additional storage

No storage or supply deficiencies were identified for the existing system or the 2040 system.

The supply and storage improvements planned by GSWC and analyzed in these evaluations are further examined in Section 6, Hydraulic Analysis and Evaluation. The hydraulic analysis helps determine the optimal configuration of improvements to provide maximum operational and cost benefit, and any resulting recommended improvements are incorporated into the CIP.

## SECTION 6

# Hydraulic Analysis and Evaluation

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This section documents the hydraulic analysis and evaluation results for the Simi Valley System. The hydraulic analysis used the calibrated computer model to evaluate the existing water system. This analysis and evaluation accomplished the following tasks:

- Summarized the criteria for the hydraulic analysis
- Performed simulations for various demand conditions and demand periods
- Analyzed the modeling results to identify deficiencies
- Analyzed various proposed improvements to investigate ways to mitigate these deficiencies
- Developed a list of recommended improvements that provide a cost-effective means to correct deficiencies

In following sections, the hydraulic analysis results of the existing water system were compared with the objectives identified in the technical memorandum titled *Master Planning Criteria and Standards* (see Appendices). When the analysis indicated that the system did not meet these criteria, a deficiency was identified and improvements were proposed to mitigate the deficiency.

## 6.1 Overview

Hydraulic analyses of networked water distribution systems are most efficiently performed with the aid of hydraulic computer models and specialized software that perform the numerical analysis. The hydraulic computer model assists with measuring system performance, analyzing operational improvements, and developing a systematic method of determining the size and timing required for new facilities. The model can be used to analyze existing water systems, future water systems, and the effect of specific improvements. By analyzing numerous planning scenarios relatively quickly and easily, the model provides answers to several “what if” questions. The computer program analyzes all of the information in the system data file and generates results in terms of pressures, flow rates, and operating status. The key to successfully using the computer model is correct interpretation of these results, and understanding how the water distribution system was affected.

## 6.2 Analysis Approach

This hydraulic analysis examined the Simi Valley System for only one planning period:

- **Existing (2019) system.** The existing water system analyses assumed 2019 demands, as described in Section 3, and facilities that were operational in 2019.

The demands used in this hydraulic analysis are the same as used for the supply and storage capacity analysis in Section 5.

### 6.2.1 System Performance Criteria

Hydraulic analysis of the water system involved the use of a computer model that was developed specifically for the Simi Valley System and calibrated to conditions observed in the field (see Section 4, Hydraulic Model Development and Calibration). This computer model was used to identify hydraulic deficiencies under the existing planning scenario. Hydraulic model simulations were developed to analyze demand periods (ADD, MDD, PHD, and MDD+FF) to determine whether the system could meet the performance objectives identified for this master plan. These criteria are summarized in TABLE 6-1.

TABLE 6-1 Hydraulic Analysis Criteria

Demand Period	Pipeline Criteria <sup>a</sup>	Pressure Criteria <sup>b</sup>
ADD	Velocity less than 5 fps and head loss less than 6 ft per 1,000 ft	Greater than 40 psi and less than 125 psi
MDD	Velocity less than 5 fps and head loss less than 6 ft per 1,000 ft	Greater than 40 psi and less than 125 psi
PHD	Velocity less than 10 fps	Greater than 30 psi and less than 125 psi
MDD + fire flow	Velocity less than 10 fps	Greater than 20 psi

<sup>a</sup> If velocity or headloss in a pipeline exceeded the criteria listed but did not result in low pressures in the system, the pipeline was not recommended for replacement due to hydraulic deficiencies alone.

<sup>b</sup> Pressure criteria apply only at service connections.

### 6.2.2 Fire-flow Requirements

In addition to providing adequate water supply and pressure to serve residential, commercial, and industrial water demands placed on the system, the water system must also deliver an adequate supply for firefighting. Since fires can occur at any time, the water system must be ready to provide the required flow at all times with an adequate residual pressure. The water system should be capable of providing the fire flows during an MDD period (MDD+FF), which represents the day of the year having the highest water demands.

To determine the system's capacity to provide adequate fire flows, it was necessary to establish minimum fire-flow demand requirements to be applied to various locations throughout the distribution system, as well as a minimum residual pressure (the pressure near the flowing hydrant) and system pressure. The local agency responsible for establishing fire-flow requirements for the Simi Valley System service area is the Los Angeles County Fire Department. Their Fire Code Regulation #8, Fire Flow and Hydrant Requirements (dated 12/15/04), was used as a guide to develop the fire-flow criteria established for this master plan, which were presented in the previous section in TABLE 5-3.

## 6.3 Existing System Hydraulic Analysis

Several hydraulic computer model simulations were conducted for the existing distribution system to identify system and operational deficiencies, and to evaluate system improvements to mitigate these deficiencies. If more than one alternative was possible to

mitigate a deficiency, the most cost-effective and constructible improvement was recommended.

### **6.3.1 Operational Assumptions**

GSWC operations staff provided information on how the Simi Valley System would normally be operated under ADD, MDD, and PHD periods. Based on this information, the facilities available for the hydraulic analysis of the existing system are presented in TABLE 6-2. (Note: The status of wells, MWD connections, booster pumps and storage tanks were not based on the model results, but on the amount of supply needed for each demand period. For ADD, there is flexibility to operate various combinations of wells, as not all of the wells need to be operational to achieve the desired pressures; for MDD and PHD scenarios, firm capacity must be used.)

TABLE 6-2 Existing System Operating Facility Status

Facility Name	ADD	MDD	PHD
<b>Wells—Main Zone</b>			
Niles #1	Available	On	On
Sycamore #3	Available	Off	Off
<b>MWD connections</b>			
Tapo	Available	On	On
Sycamore	Available	On	On
Rebecca	Available	On	On
Fitzgerald	Available	On	On
Katherine	Available	On	On
<b>Booster pumps</b>			
Fitzgerald Booster A	Available	On	On
Fitzgerald Booster B	Available	Off	Off
Katherine Booster A	Available	On	On
Katherine Booster B	Available	Off	Off
Katherine Booster C	Available	Off	Off
Katherine Booster D	Available	Off	Off
Niles Booster A	Available	On	On
Niles Booster B	Available	On	On
Niles Booster D	Available	Off	On
Niles Booster E	Available	Off	On
Niles Booster F	Available	Off	Off
Pineview Booster A	Available	On	Off
Pineview Booster B	Available	Off	On
Pineview Booster C	Available	Off	On
Pineview Booster D	Available	Off	On
Rebecca Booster A	Available	On	On
Rebecca Booster B	Available	Off	On
Rebecca Booster C	Available	Off	Off
Tapo Booster C	Available	Off	On
Tapo Booster D	Available	Off	Off
Tapo Booster E	Available	Off	Off
Aspen Booster A	Not Available	-	-
Aspen Booster B	Not Available	-	-

Facility Name	ADD	MDD	PHD
<b>Storage tanks</b>			
Alamo Reservoir	75%	75%	75%
Lautenschlager #1	75%	75%	75%
Lautenschlager #2	75%	75%	75%
Niles Forebay	75%	75%	75%
Pineview Reservoir	75%	75%	75%
White Bark Reservoir	Not Available	-	-
Tapo Reservoir	75%	75%	75%

### 6.3.2 Average Day Scenario Analysis

To analyze the average day scenario for the existing system, simulations were performed using the computer model with ADD. The demands were distributed in the model per TABLE 5-4, for a total demand of approximately 4,117 gpm. Only the facilities listed as 'Available' in TABLE 6-2 were used for ADD. (Note: Storage should not be drawn down for this planning scenario.) The modeling results were compared to the criteria identified in TABLE 6-1, and are discussed in Subsection 6.3.6.

### 6.3.3 Maximum Day Scenario Analysis

To analyze the maximum day scenario for the existing system, simulations were performed using the computer model with MDD. The demands were distributed in the model per TABLE 5-4, for a total demand of approximately 6,771 gpm. Only the facilities listed as 'On' in TABLE 6-2 were used for MDD. (Note: Storage should not be drawn down for this planning scenario.) The modeling results were compared to the criteria identified in TABLE 6-1, and are discussed in Subsection 6.3.6.

### 6.3.4 Peak Hour Scenario Analysis

To analyze the peak hour scenario for the existing system, simulations were performed using the computer model with PHD. The demands were distributed in the model per TABLE 5-4, for a total demand of approximately 10,156 gpm. Only the facilities listed as 'On' in TABLE 6-2 were used for PHD. (Note: Storage may be drawn down for this planning scenario.) The modeling results were compared to the criteria identified in TABLE 6-1, and are discussed in Subsection 6.3.6.

### 6.3.5 Fire-flow Scenario Analysis

For this master plan revision, the fire flow scenario was not analyzed.

### 6.3.6 Analysis Results and Recommended Improvements for the Existing System

Various alternatives were considered to correct the hydraulic deficiencies identified in the hydraulic analysis. The proposed improvements were evaluated for their ability to correct the deficiency and for their cost-effectiveness as compared to other alternatives.

## Steady-State Deficiencies

The deficiencies identified in the ADD, MDD, and PHD simulations for the existing system are presented in TABLE 6-3 (Note: This table also includes any existing system improvements for supply and storage from Section 5). These deficiencies were analyzed in detail using the computer model by adding proposed improvements, reviewing the updated results, and repeating this process until acceptable results were obtained.

The distribution system was analyzed to identify areas of the system that experienced pressures below 40 psi or above 125 psi (criteria identified in TABLE 6-1). Various steady-state planning scenarios were used to analyze system pressures under different demand conditions to verify adequate system pressures. Where low pressures were observed during the analysis, one or more approaches were used to mitigate the low-pressure problem. In some cases, low pressures can be corrected with no physical improvement, such as by increasing the pressure setting of an upstream pressure regulating valve. However, sometimes substantial improvements may be required. Improvements may include replacing older pipelines with larger diameter pipelines to reduce friction losses, constructing new pump stations or pressure regulating stations, or modifying the boundaries of an existing pressure zone.

High velocities in water pipelines can also be an indication of an operational deficiency, and can lead to scouring of the pipe lining material or increase the chances of a valve failure. Increased velocities contribute to increased head loss, usually resulting in a less efficient water distribution system. Higher velocities may be acceptable for short-term operation, such as when needed for fire-flow, but otherwise should be lower where practical. The planning scenarios used to analyze the Simi Valley System for pressure deficiencies were also used to evaluate the velocities under the same demand periods (ADD, MDD, and PHD). The velocity criteria used to evaluate the distribution system for each demand period were defined in TABLE 6-1.

As stated in footnote 'a' of TABLE 6-1, "If velocity or headloss in a pipeline exceeded the criteria listed but did not result in low pressures in the system, the pipeline was not recommended for replacement." Thus, pipelines with velocities above the criteria identified in TABLE 6-1 but below 10 fps were reviewed for excessive pressure loss resulting in low pressures or excessive energy use. Where the velocities did not appear to contribute to pressure problems or excessive pumping, then no deficiency was identified and no improvement was proposed.

The numbering system used in deficiency tables below is a series of three numbers. The first number indicates the planning period: 1 for the existing system and 2 for the 2035 system. The second number indicates the deficiency number, which starts at 1 and increases by 1 for each deficiency identified. The third number identifies the improvement alternative (zero is reserved for the deficiency identification). Proposed improvements to correct the deficiency are numbered starting at 1. Therefore, the alternative number 1.2.3 would be used to identify the third proposed alternative for the second deficiency in the existing system. (Note: Deficiencies identified may not start with the number 1.1.0 if there are deficiencies identified in a prior section of this master plan.)

TABLE 6-3 Existing System Deficiencies and Recommend Improvements for ADD, MDD, and PHD

Deficiency/ Alternative Number	Location	Deficiency	Recommended Improvement
<b>1.1.0</b>	<b>Alamo Zone</b>	<b>MDD headloss</b>	
1.1.1	16-inch DIP e/o Niles Plant discharge pipe		Upsize existing main to 24-inch PVC from Niles Plant discharge to Sycamore Dr.
1.1.2	8-in AC and CI Sycamore Dr, Niles Plant to Los Angeles Ave		Project under construction to upsize existing main to 12-inch PVC
1.1.3	8-in AC Sycamore Dr, Niles Plant to Larch St		---
1.1.4	10-in AC Cochran St, Kadota to Stearn		---
<b>1.2.0</b>	<b>Alamo Zone</b>	<b>MDD Pressure (&lt;40 psi)</b>	
1.2.1	Cochran St, Stearn St to 6-in PRV e/o Stow St		---

Note: None of the above velocity or headloss deficiencies resulted in low pressures in the system. Therefore, these pipelines will not be recommended for replacement due to hydraulic deficiencies alone. However, these pipelines may be recommended for replacement in Section 8 (System Condition Assessment), due to age and material of the main.

# Water Quality Evaluation

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The purpose of this section is to provide documentation of GSWC's water quality assessment effort for the Simi Valley System. Water quality of local groundwater and imported water were evaluated based on current federal and state standards and rules.

## 7.1 Current Status of Drinking Water Quality

The Simi Valley System is supplied by two active wells, Niles Well #1 and Sycamore Well #3, both of which exceed or are close to exceeding state and federal standards for a number of constituents. The Simi Valley System obtains the bulk of its water from the Calleguas Municipal Water District (CMWD) through five interconnections. As a part of the Southern California Metropolitan Water District (SCMWD), CMWD obtains its water from the California State Water Project (CSWP).

The drinking water quality of the Simi Valley System must comply with the Safe Drinking Water Act (SDWA), which is composed of primary and secondary drinking water standards. Compliance with primary drinking water standards is regulated by the U.S. Environmental Protection Agency (EPA). Compliance with both primary and secondary standards is required by State Water Resources Control Board Division of Drinking Water (DDW).

Water quality sampling is performed at the source and within the distribution system to ensure compliance with regulatory standards. Sources are sampled as prescribed in Title 22 of the California Code of Regulations. Monitored constituents include general mineral, general physical, inorganic, volatile organic, synthetic organic, and radiological chemicals. The frequency of monitoring is dependent upon the parameter tested and the concentration of the constituent in the source water. Monitoring frequencies range from weekly to once every 9 years. The parameters monitored include specific constituents of concern (that is, if treatment is provided then the constituent being treated for would be tested), coliform bacteria, heterotrophic plate counts (HPCs), and chlorine residual. The distribution system is tested regularly for coliform bacteria, chlorine residual, general physical parameters, and disinfection by-products (trihalomethanes [TTHM] and haloacetic acids [HAA5]). The distribution system is tested weekly for the presence of coliform bacteria at representative locations throughout the system and general physical samples. Collection of disinfection by-product samples is performed on a quarterly basis.

## 7.2 Imported Water Quality

The Simi Valley System obtains the bulk of its water from the CMWD through five interconnections. As a part of the Southern California Metropolitan Water District (SCMWD), CMWD obtains its water from the California State Water Project (CSWP).

## 7.3 Groundwater Quality

The Simi Valley Systems active groundwater sources currently must be blended with CMWD water in order to lower the levels primarily of total dissolved solids (TDS) and nitrate.

## 7.4 Water Quality Evaluation

The following discussion provides information on the relevant water quality evaluation rules for the Simi Valley System, including:

- Total dissolved solids (TDS)
- Nitrate
- Nitrification
- Selenium
- Per- and Polyfluoroalkyl Substances

### 7.4.1 Total Dissolved Solids (TDS)

TDS in both Niles Well #1 and Sycamore Well #3 is above the SMCL; while the level in the Niles Well seems to have stabilized at around 1600 mg/L, the level in the Sycamore Well continues to climb, and is currently at around 2000 mg/L. The TDS in these wells is the major limiting factor in how much water can be used. Purchased water from CMWD averages TDS of approximately 320 mg/L.

A current blend goal of approximately 800 mg/L TDS is used to reduce customer complaints. To reach this level the wells contribute 25% to 30% of the blend water with the remaining coming from CMWD.

### 7.4.2 Nitrate

Nitrate levels at both Niles Well #1 and Sycamore Well #3 are above the MCL but appear to have stabilized at 10 to 14 mg/L. Blending plans are in place to ensure the water from these wells is blended with CMWD water in ratios that will result in finished water below the MCL. An online nitrate analyzer would provide real-time tracking of the blended effluent. A future nitrate analyzer should also be integrated with the SCADA system to provide alarms and shutdown capability.

### 7.4.3 Nitrification

Nitrification is a process by which microbes convert free ammonia to nitrite and nitrite to nitrate. This can occur in systems that have available free ammonia in areas with low turnover. Nitrite levels are the primary indicator showing the prevalence of nitrification.

Simi Valley has historically had low turnover in Alamo Reservoir and White Bark Reservoir resulting in periods of high nitrite levels. During summer and fall of 2015 all reservoirs saw an increase in nitrite levels due to multiple factors. These factors include water conservation in the area decreasing the turnover rate in all reservoirs, high ambient temperatures promoting microbial growth and historically high nitrite levels in the purchased water. A more robust turnover schedule has been implemented to lower water age in these

reservoirs. When necessary, the reservoirs can be turned over more quickly to reduce the water age and prevent large degrees of nitrification.

#### **7.4.4 Selenium**

Selenium levels in the Simi Valley system wells are currently running near the MCL. The average selenium levels for 2016-2019 were 36 ug/L in Niles Well #1 and 63 ug/L in Sycamore Well #3. The blended selenium average for the two wells and the purchased water interconnection was 15 ug/L. Continued blending of these sources will sufficiently keep the selenium levels below the MCL.

#### **7.4.5 Perchlorate**

The current MCL for perchlorate is 6 ug/L. The PHG was changed from 6 ug/L to 1 ug/L in 2015. Because the PHG was changed by the Office of Environmental Health Hazard Assessment (OEHHA), the California State Water Board will be revisiting the current MCL in the future. The future perchlorate MCL should be as close to the PHG as technologically and economically feasible. The current average levels of perchlorate in Niles Well #1 and Sycamore Well #3 are 3.2 ug/L and 4.1 ug/L, respectively. The average concentration in the blended effluent is <2 ug/L. The current blending plan is sufficient to reduce perchlorate to an acceptable level that is below the DLR of 4 ug/L. This blending scheme should be reevaluated if a new, lower perchlorate MCL is introduced.

#### **7.4.6 Per- and Polyfluoroalkyl Substances**

Per- and polyfluoroalkyl substances (PFAS) are a varied and sundry group of compounds used in a variety of industrial and commercial applications including fire-fighting foams, clothing, metal plating, and upholstery.

As part of EPA's third unregulated contaminant monitoring rule (UCMR3) the entry points to the distribution system were monitored for six PFAS including PFOA and PFOS between 2013 and 2015. No PFAS was detected above the method reporting limits. The combined reporting limit for PFOA and PFOS was 60 ng/L.

The following outlines regulatory requirements for PFAS:

- In 2015, the EPA released a health advisory for two PFAS compounds, perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), at a combined total of 70 nanograms per liter (ng/L).
- In July 2018, DDW set a notification level for PFOS of 13 ng/L and PFOA of 14 ng/L with a recommendation for source treatment or removal from service at a combined 70 ng/L. In the absence of a federal MCL, several states are in the process of developing MCL for PFAS.
- In March 2019, DDW issued the first phase of mandatory PFAS testing orders for public water systems across California based on proximity to: airports with fire training/response sites and previous PFOA/PFOS detections. The Simi Valley water system did not receive a mandatory testing order in the first phase.
- In August 2019, DDW revised the notification levels from 13 ng/L to 6.5 ng/L for PFOS and from 14 ng/L to 5.1 ng/L to PFOA.

The regulatory requirements for PFAS are expected to develop over the next one to three years. Regulations for this emerging contaminant will be closely monitored by Golden State Water.

## 7.5 Recommended Improvements

The water quality concerns that were discussed in the previous sections are summarized in TABLE 7-1.

TABLE 7-1 Recommended Improvements to Address Water Quality Concerns

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Alternative Number	Alternative Description
<b>1.3.0</b>	<b>Nitrate Analyzer</b>
1.3.1	Analyzers for in-line nitrate blending should be added to the Niles Plant blend point. SCADA should be integrated with the analyzer with high nitrate alarms and shutdown capabilities.

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## SECTION 8

# System Condition Assessment

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The purpose of this section is to provide documentation of GSWC's system condition assessment effort for the Simi Valley System. This section is organized as follows:

- Previous system condition assessment efforts
- Updated condition assessments

## 8.1 Previous System Condition Assessment Efforts

More than 10 years ago, GSWC conducted several facility condition assessment efforts, working with multiple engineering consulting companies to develop a complete condition assessment for each of the Company's systems. Facilities in the Simi Valley System were addressed in this effort.

Generally, the purpose of these studies was to inspect and evaluate existing facilities to determine if upgrades would produce significant benefit to offset expenditures. These studies included the following information:

- Evaluations of the safety of the facilities
- Outstanding code violations
- A general evaluation of condition and reliability

## 8.2 Updated Condition Assessments

For this Master Plan, GSWC Operations and Planning personnel reviewed the condition of plant facilities and pipeline data within the Simi Valley System in order to identify the facilities requiring upgrade or replacement. For the pipeline conditional assessments, no specific recommendations were made based solely on condition, but age and material were considered along with pipeline leaks/breaks and input from operations staff.

### 8.2.1 Facility Condition Review

The purpose of this review was to identify plant improvement projects based on the following:

- Operational needs and requests
- Common items that are not installed at all plant sites
- Recommendations from the previous condition assessments that were not installed

GSWC reviewed each of the following elements to identify potential recommended improvements at each facility:

- Electrical
- Mechanical
- Structural
- Other site improvements

TABLE 8-1 summarizes the recommendations that were developed as a result of the system condition assessment review.

TABLE 8-1 2011 Condition Assessment Plant Projects

Alternative Number	Facility	Project Description	Reason	Priority Category
1.4.0	Fitzgerald Plant	Upgrade booster station; install pump house	Install new MCC (existing on plywood w/ steel supports), SCADA and enclosures for two booster pumps to protect pumps and increase their useful life	Short-term
1.5.0	Systemwide	SCADA software and hardware upgrades	Run Master SCADA radio site during outages; upgrade software to match company standards	Short-term
1.6.0	Pineview Plant	Replace damaged roof elements and ladder in reservoir	Prolong useful life of reservoir	Short-term
1.7.0	Pineview Plant	Site improvements	Slurry site to extend life of pavement	Short-term
1.8.0	Sycamore Plant	Destroy Well #2	Well out of service; Ventura County ordinance requires production over last 12 months, well destruction if production has not occurred	Short-term
1.9.0	Alamo Plant	Reservoir and site improvements	Seismic/structural improvements to reservoir; 800 LF of chain link fence and entry gates in need of replacement for improved access/security; pave access road and stabilize slope above reservoir	Short-term
1.10.0	Rebecca Plant	Site improvements	Install paving/gravel on site for all-weather access	Short-term
1.11.0	Sycamore Plant	Site improvements	Install lighting and PRV/pump-to-waste modifications. Pave entrance and gravel into plant site (currently gravel is kicked out onto sidewalk, causing safety hazard)	Short-term
1.12.0	Tapo Plant	Reservoir and site improvements	Seismic/structural improvements to reservoir; site paving has deteriorated and there are issues with standing water; when wet, site access is slippery and dangerous	Short-term
1.13.0	Lautenschlager Plant	Site improvements	Existing ground is in poor condition and does not drain appropriately; install drainage to ensure water drains away from tanks, paving and gravel	Short-term
2.1.0	Niles Plant	Increase booster capacity	Optimize groundwater usage/blend; upsize Booster A to match design point of Booster B	Long-term
2.2.0	Katherine Plant	Install booster pump house	Booster station near school; noise issues	Long-term

2.3.0	System-wide	Water supply reliability study	Known high TDS in groundwater, need brine disposal; could offset treatment costs by saving on lower cost of groundwater vs. purchased water	Long-term
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## 8.2.2 Pipeline Condition Review

In addition to facility condition, GSWC monitors distribution system condition through the tracking of pipeline leaks/breaks on an annual basis; FIGURE 8-1 is a map of the leaks in the Simi Valley System from 2014 to 2018. This information was used, along with additional risk assessment analysis, to make recommendations regarding potential CIP projects and in the prioritization of those projects. (See GSWC's *Pipeline Management Program Report* and *Risk Based Asset Management Program Report*.)

TABLE 8-2 2011 Condition Assessment Pipeline Projects

Alternative Number	Recommended Improvement	Reason	Priority Category
1.14.0	Watson Ave, Talbert to Beaver, Approximately 600 LF of 8-inch PVC	Eliminate NC valves/dead ends in Alamo Zone	Short-term
1.15.0	Alamo St, Broadmoor to Atherwood, Approximately 1,500 LF of 12-inch PVC	Provide loop to improve hydraulics, water age and eliminate a dead-end	Short-term
1.16.0	Gage Ave, Alamo Plant inlet/outlet piping, Approximately 2,000 LF of 16-inch PVC	Existing inlet/outlet piping 16-inch CI buried deep in easement; relocate into right-of-way in Gage Ave	Short-term
1.17.0	Cochran St e/o Sycamore, Approximately 300 LF of 8-inch PVC	Close loop to eliminate dead-end, improve water quality	Short-term
2.4.0	118 Freeway Crossing, Phyllis St to Woodrow Ave, Approximately 300 LF of 8-inch PVC	Cast Iron (cement lined, encased) Freeway Crossing	Long-term
2.5.0	118 Freeway Crossing, Greenleaf Ct to Knightwood Pl, Approximately 500 LF of 8-inch PVC	Cast Iron (cement lined, encased) Freeway Crossing	Long-term

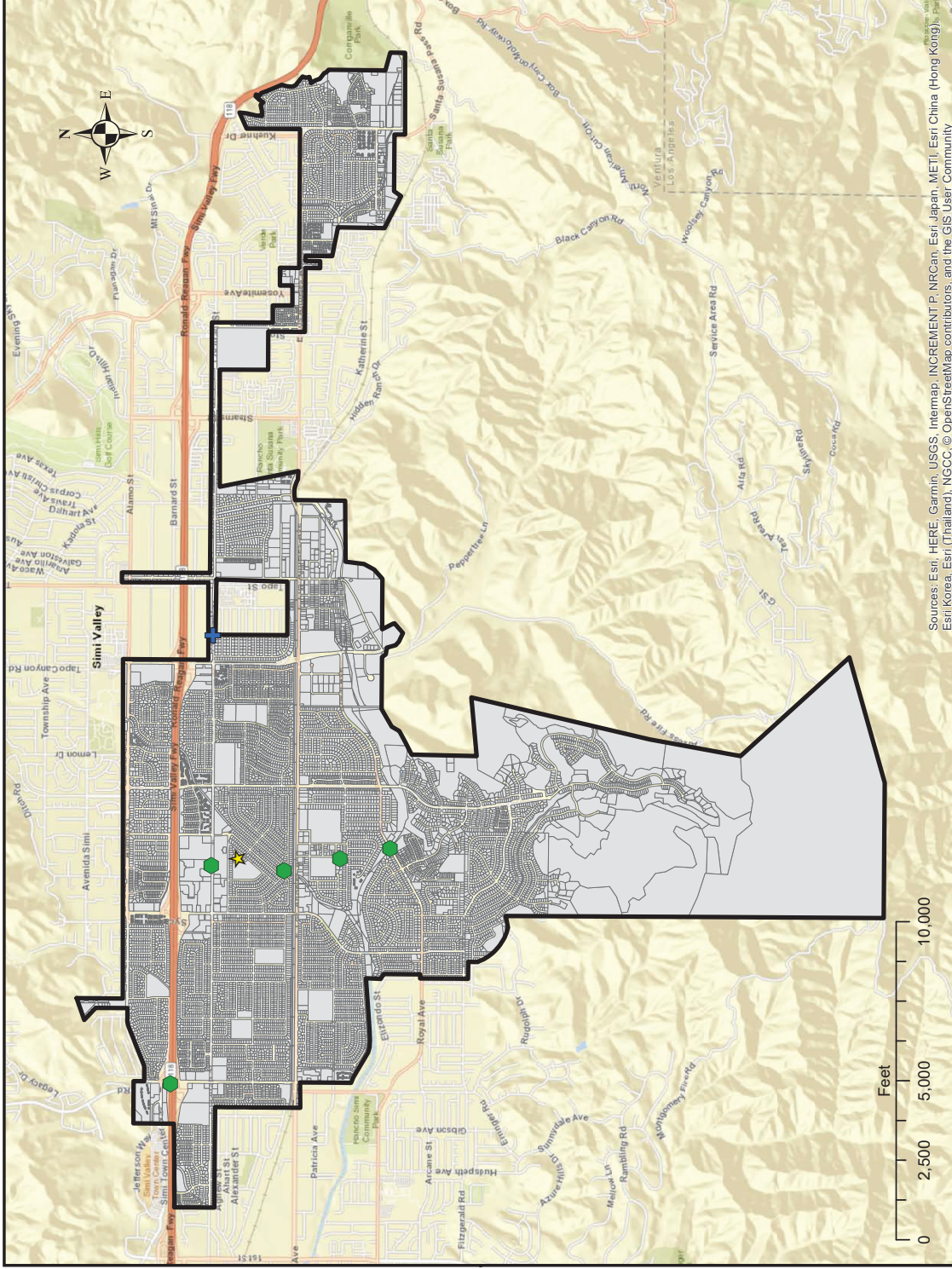
**Figures**

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# SIMI VALLEY SYSTEM LEAK MAP 2014 - 2018

## Year & Number of Leaks

- + 2014 - 1 Leak
- 2015 - 0 Leaks
- 2016 - 5 Leaks
- ▲ 2017 - 0 Leaks
- ★ 2018 - 1 Leak



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Last Update: 1/14/2019

## SECTION 9

# Capital Improvement Program

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The capital improvement program (CIP) is an essential component of this water master plan. The CIP summarizes recommended facilities, and establishes the priority and timing of necessary improvements. The recommended improvements were analyzed and evaluated in the previous sections of this report.

The recommended improvements were prioritized into two categories—short-term (existing system) or long-term (2035 system)—to identify when these improvements are required. The project selection and prioritization process considered various issues, including existing deficiencies, projected demands, water quality, regulatory compliance, reliability and facility condition.

## 9.1 Cost Estimation

No cost estimates are included in this master plan, as the final costs of a project, and the project's resulting feasibility, will depend on actual labor and material costs, inflation, competitive market conditions, actual site conditions, final project scope, implementation schedule, continuity of personnel and engineering, and other variable factors. Prior to design and construction of any recommended project in this master plan, a detailed project cost estimate will be created.

## 9.2 Project Prioritization

The following descriptions define how projects were prioritized into one of the two categories:

- **Short-term improvement projects** were based on deficiencies identified in the existing system. Deficiencies included supply and storage, hydraulic, condition assessment, and water quality. Operational improvements were included as a short-term improvement only when a significant short-term benefit was identified.
- **Long-term improvement projects** are based on deficiencies identified beyond the short-term planning years through the year 2035. The water system was assumed to be built out by the year 2035. The long-term improvements are typically projects necessary to meet future demands and replace or rehabilitate aging infrastructure.

## 9.3 CIP Projects

TABLE 9-1 lists the recommended improvements for the Simi Valley System. Each project is assigned a unique identification number and a priority: short-term or long-term. Short-term pipeline projects are shown on FIGURE 9-1.

TABLE 9-1 Summary of Recommend CIP Projects

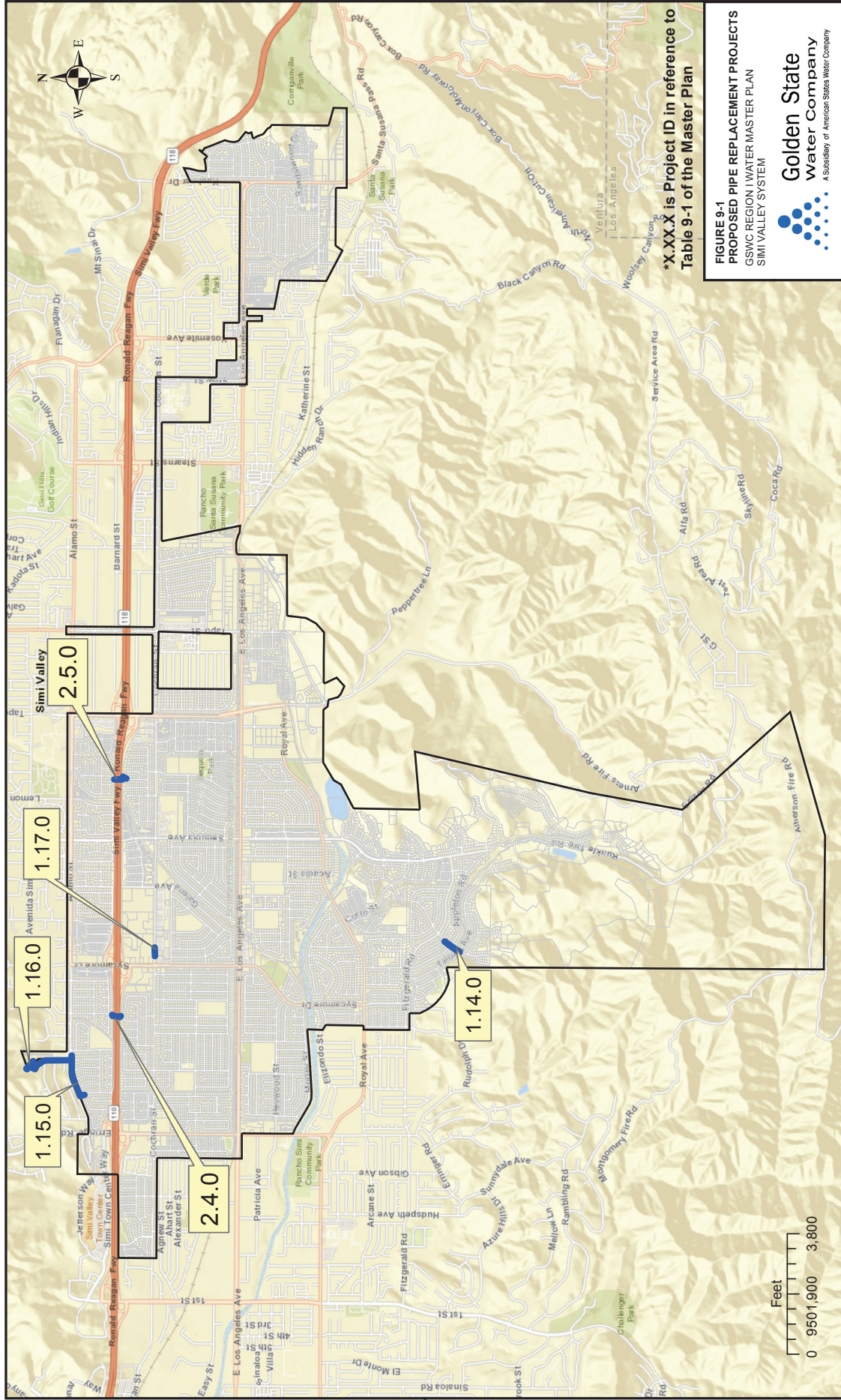
Project ID	Recommended Improvement	Improvement Type	Priority Category
1.3.1	Analyzers for in-line nitrate blending added to Niles Plant blend point. SCADA integrated with analyzer.	Water Quality	Short-term
1.4.0	Upgrade Fitzgerald Plant booster station, install pump house	Conditional Assessment	Short-term
1.5.0	Systemwide SCADA software and hardware upgrades	Conditional Assessment	Short-term
1.6.0	Replace damage roof elements and ladder in Pineview Plant Reservoir	Conditional Assessment	Short-term
1.7.0	Pineview Plant site improvements	Conditional Assessment	Short-term
1.8.0	Destroy Sycamore Plant Well #2	Conditional Assessment	Short-term
1.9.0	Alamo Plant Reservoir and site improvements	Conditional Assessment	Short-term
1.10.0	Rebecca Plant site improvements	Conditional Assessment	Short-term
1.11.0	Sycamore Plant site improvements	Conditional Assessment	Short-term
1.12.0	Tapo Plant Reservoir and site improvements	Conditional Assessment	Short-term
1.13.0	Lautenschlager Plant site improvements	Conditional Assessment	Short-term
1.14.0	Watson Ave, Talbert to Beaver	Conditional Assessment/ Hydraulic	Short-term
1.15.0	Alamo St, Broadmoor to Atherwood	Conditional Assessment/ Hydraulic	Short-term
1.16.0	Gage Ave, Alamo Plant inlet/outlet piping	Conditional Assessment	Short-term
1.17.0	Cochran St e/o Sycamore	Conditional Assessment/ Hydraulic	Short-term
2.1.0	Increase Niles Plant booster capacity	Conditional Assessment/ Supply	Long-term
2.2.0	Install Katherine Plant booster pump house	Conditional Assessment	Long-term
2.3.0	Systemwide water supply reliability study	Conditional Assessment/ Supply	Long-term
2.4.0	118 Freeway Crossing, Phyllis St to Woodrow Ave	Conditional Assessment	Long-term
2.5.0	118 Freeway Crossing, Greenleaf Ct to Knightwood	Conditional Assessment	Long-term

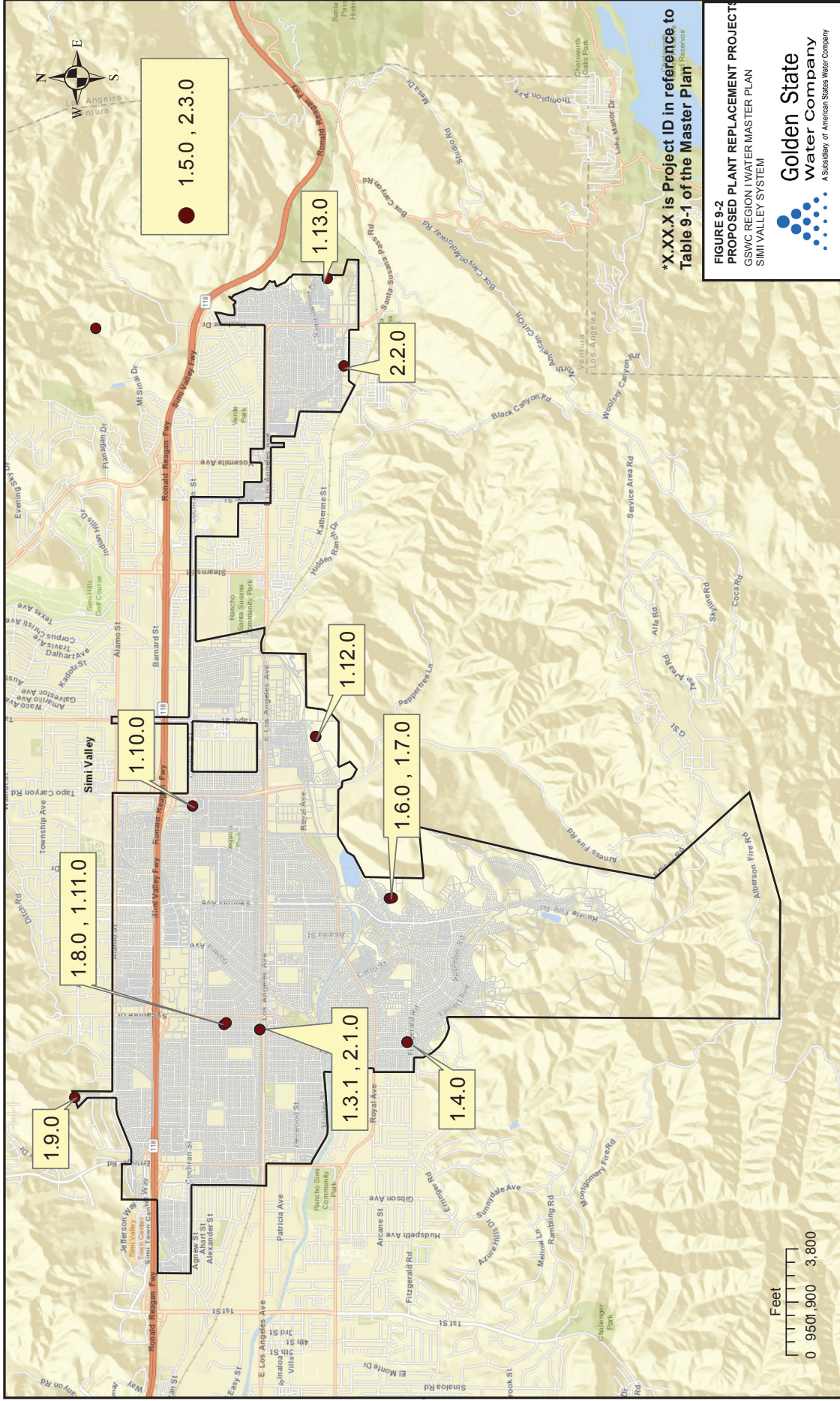
## 9.4 Additional Considerations

N/A

**Figures**

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